VOL. XXV. No 7. JULY 1940

MECCANO MAGAZINE

IN HARBOUR

6D.

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WITH MECCANO

Every boy can build Meccano models—and make them work, just like the real thing. Meccano parts are real interchangeable engineering parts in miniature. They build a never-ending succession of superb models – bridges, clocks, cranes, towers, aeroplanes, locomotives, machine tools – in fact, everything that interests boys. You can't start Meccano too soon; and you'll never lose interest – there is always something new to make.

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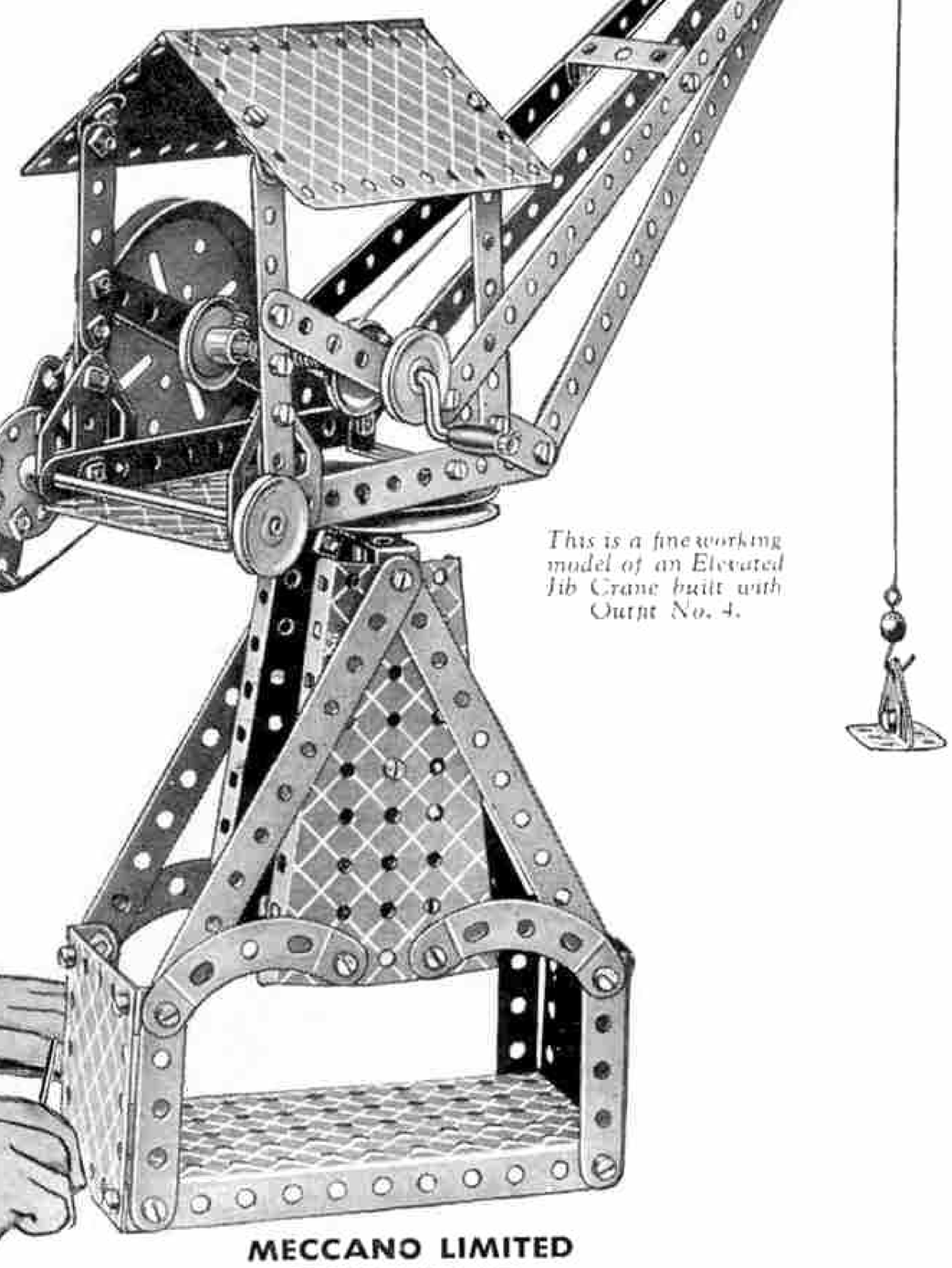
Prices subject to alteration without notice



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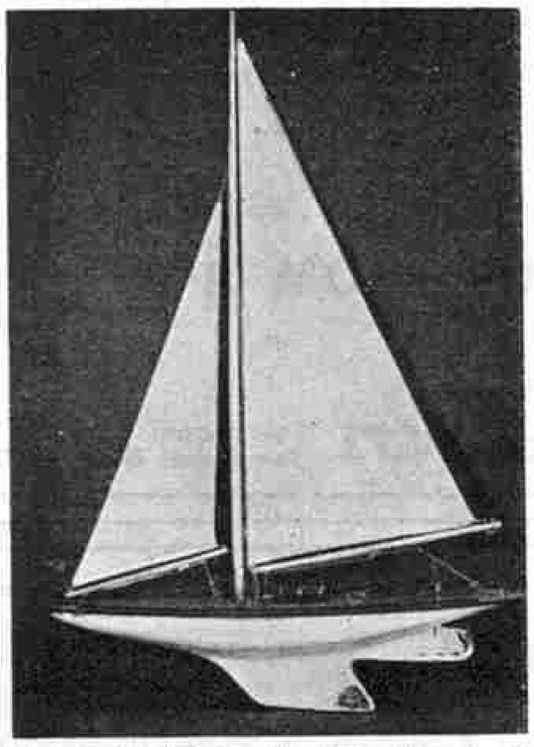

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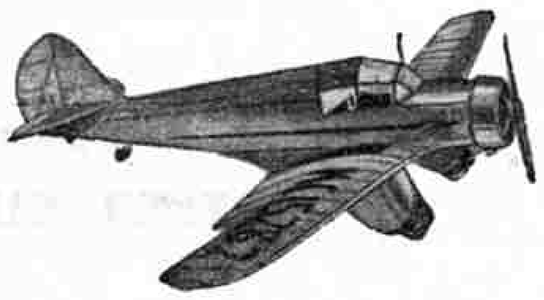

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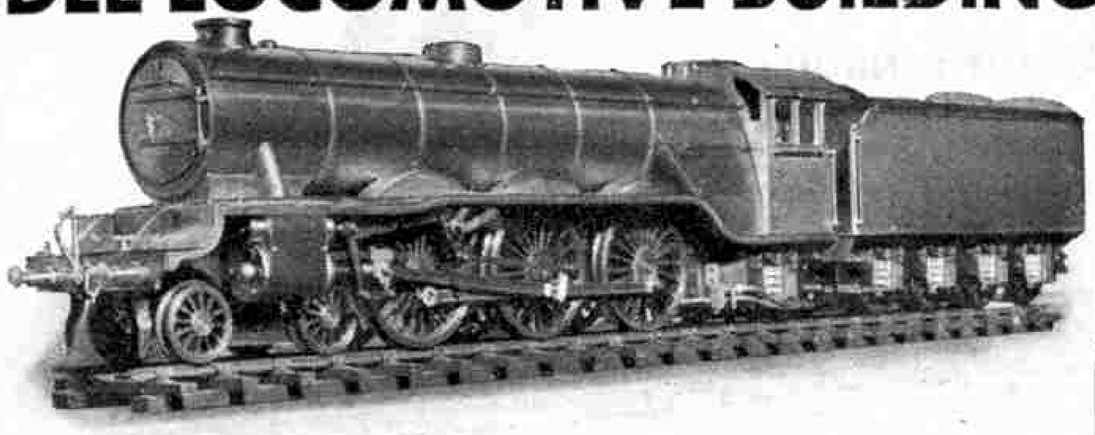

Illustrated is a picture of a 2½ inch gauge, ⅜ inch scale, "FLYING SCOTSMAN" locomotive, and for the more advanced model builder we have sets of drawings, castings and materials for its building, either high pressure steam or coal fired. Send for the free list of parts. Sixpenny booklet on how to make it also available.

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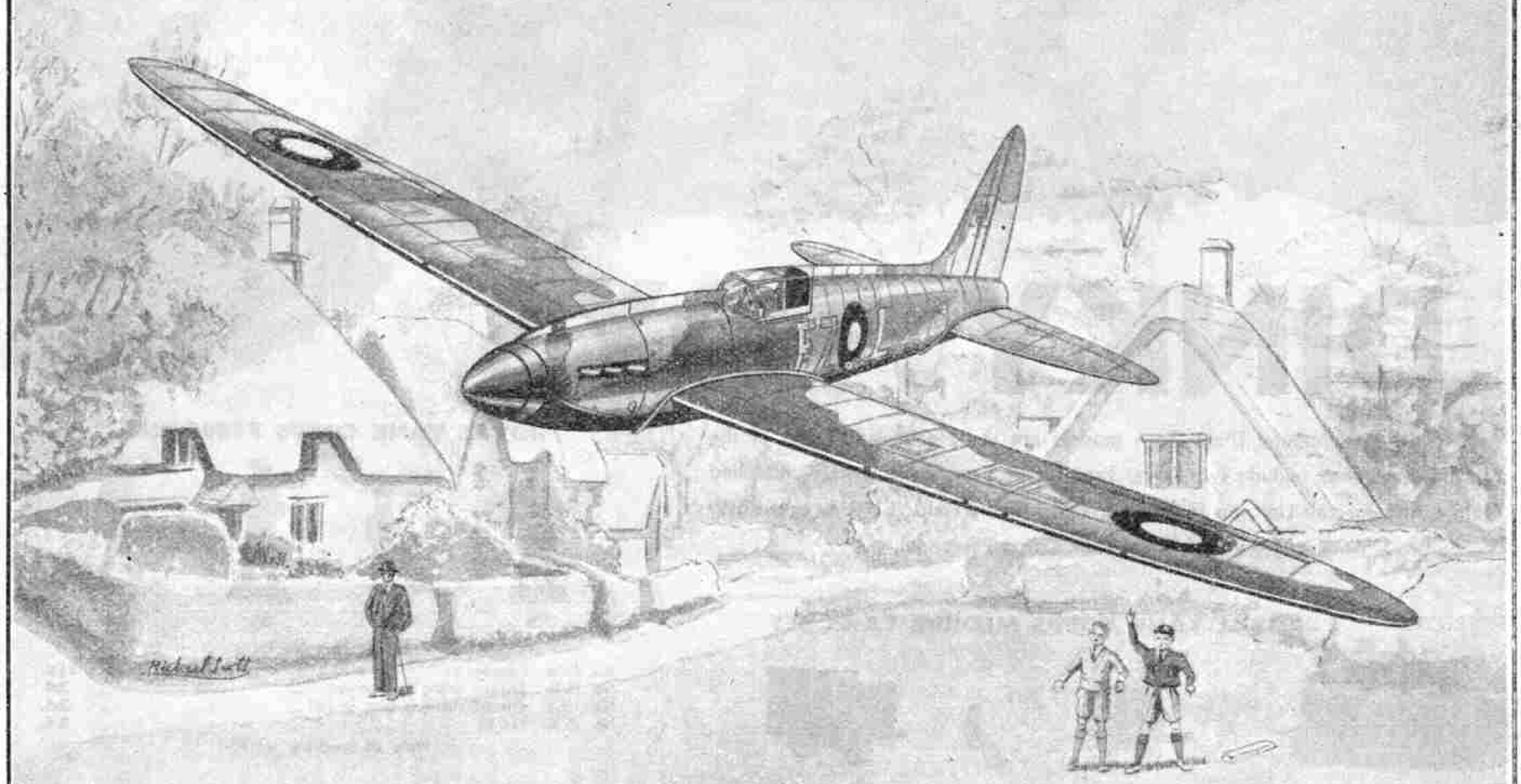

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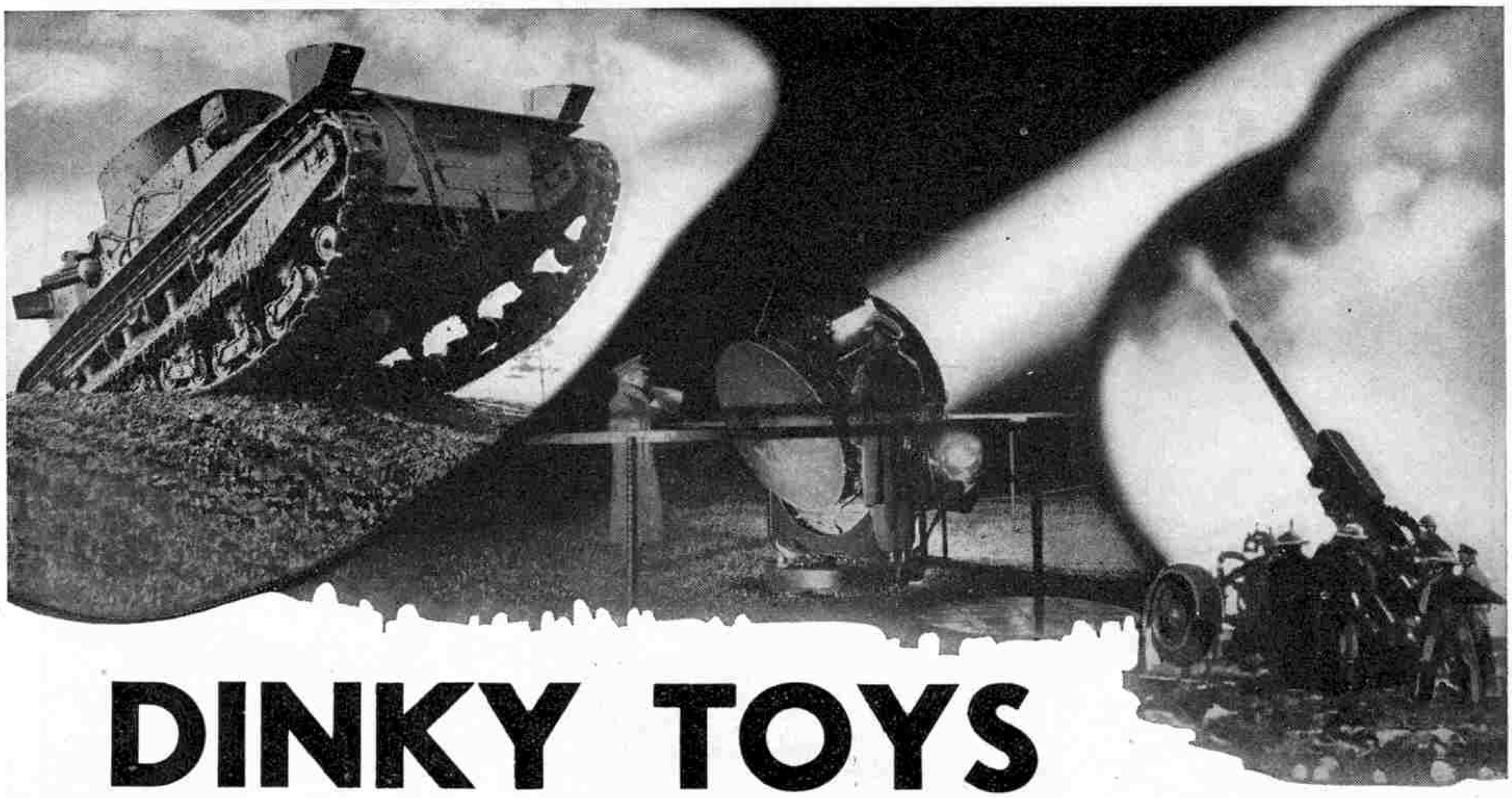

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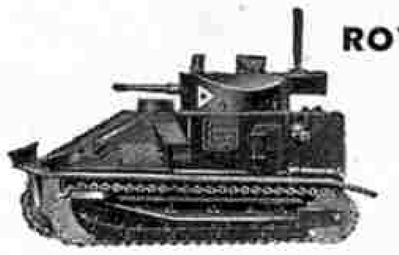
Among the most popular Dinky Toys models are the Mechanised Units of the British Army. They include two Royal Tank Corps Sets, an accurately modelled Mobile Anti-Aircraft Unit, an 18-pounder Quick-Firing Field Gun Unit and Royal Artillery and Royal Tank Corps Personnel.

ROYAL TANK CORPS MEDIUM TANK SET



151a

151d

150d

151c

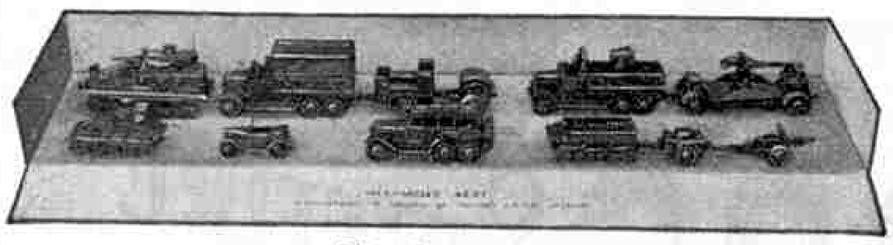
151b

Dinky Toys No. 151

No. 151a	Medium Tank	each	**2/-**
No. 151b	Transport Wagon ...	„	**1/4**
No. 151c	Cooker Trailer	„	**9d.**
No. 151d	Water Tank Trailer ...	„	**6d.**
No. 150d	Driver	-	**2d.**

Price of complete set **4/9**

MECHANISED ARMY



Dinky Toys No. 156

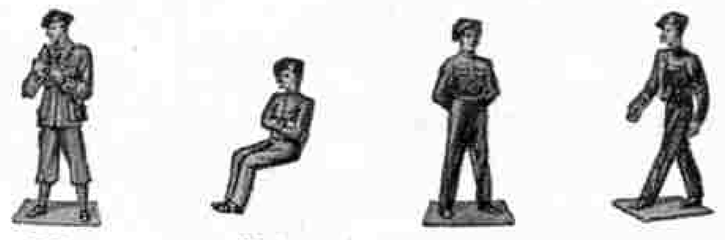
This fine set contains the principal units of a modern mechanised army. It includes the following items:
Royal Tank Corps Medium Tank Set (Dinky Toys No. 151) without driver.
Royal Tank Corps Light Tank Set (Dinky Toys No. 152) without driver.
Mobile Anti-Aircraft Unit (Dinky Toys No. 161).
18-Pounder Quick-Firing Field Gun Unit (Dinky Toys No. 162).
Price **15/-**

18-POUNDER QUICK-FIRING FIELD GUN UNIT

Dinky Toys No. 162

Comprises scale models of an 18-pounder Quick-Firing Field Gun, Trailer and "Light Dragon" Motor Tractor. Price **3/-** per set

ROYAL TANK CORPS PERSONNEL



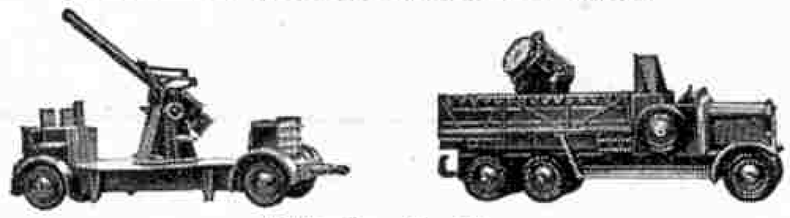
150a 150b 150c 150e

Dinky Toys No. 150

No. 150a	Officer	each	**2½d.**
No. 150b	Private, sitting (two in set)	„	**2d.**
No. 150c	Private, standing (two in set)	„	**2d.**
No. 150e	N.C.O.	„	**2d.**

Price of complete set **1/-**

MOBILE ANTI-AIRCRAFT UNIT



Dinky Toys No. 161

Comprises scale models of a Quick-Firing Anti-Aircraft Gun mounted on a mobile platform and a Searchlight mounted on a lorry. Both Gun and Searchlight have elevating and traversing movements. Price **4/-** per set

ROYAL TANK CORPS LIGHT TANK SET

152a 150d 152b 152c

Dinky Toys No. 152

No. 152a	Light Tank ...	each **1/5**	No. 152c	Austin Seven Car	each **6d.**
No. 152b	Reconnaissance Car	„ **1/5**	No. 150d	Driver ...	„ **2d.**

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ROYAL ARTILLERY PERSONNEL

Dinky Toys No. 160

For use with Dinky Toys No. 161, Mobile Anti-Aircraft Unit and No. 162, 18-pounder Quick-Firing Field Gun Unit.

No. 160a	N.C.O.	each	**2½d.**
No. 160b	Gunner, sitting (two in set)	„	**2d.**
No. 160c	Gunlayer	„	**2d.**
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160a 160b 160c 160d

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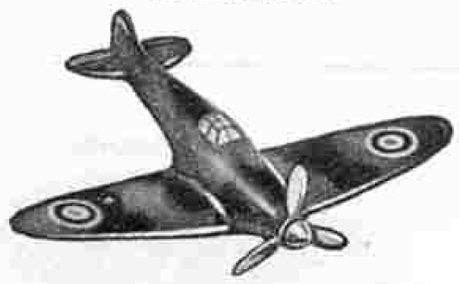
(German Service colours)

Dinky Toys No. 67a

Model of the Junkers Ju 89, one of the largest heavy bombers employed by the German Air Force. Price **1/6** each

VICKERS-SUPERMARINE "SPITFIRE" FIGHTER
(Camouflaged)



Dinky Toys No. 62e

Scale model of the Vickers-Supermarine "Spitfire," one of the fastest fighter aircraft used by the Royal Air Force.

No. 62e Camouflaged ... **6d.** each
No. 62a Aluminium Finish ... **6d.** each

AIRSPEED "ENVOY" MONOPLANE

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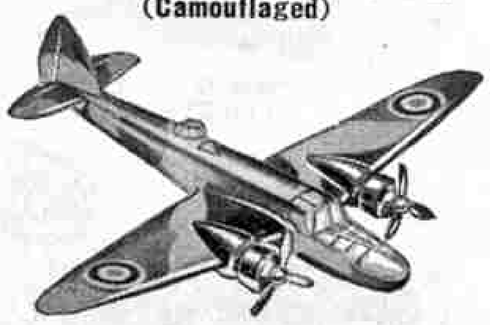
"BRISTOL" BLENHEIM BOMBER
(Camouflaged)



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Realistic model of the latest "Bristol" Blenheim Bomber extensively used by the Royal Air Force

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No. 62b Aluminium Finish ... **9d.** each

FAIREY "BATTLE" BOMBER
(Camouflaged)

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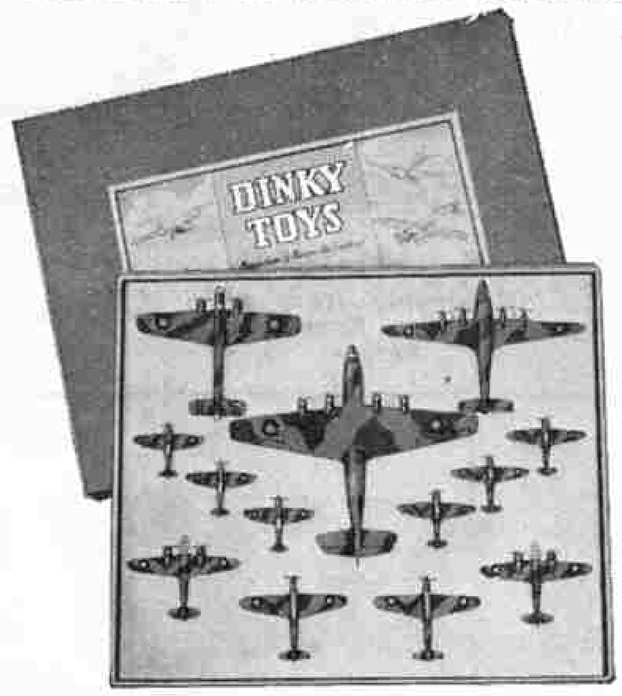
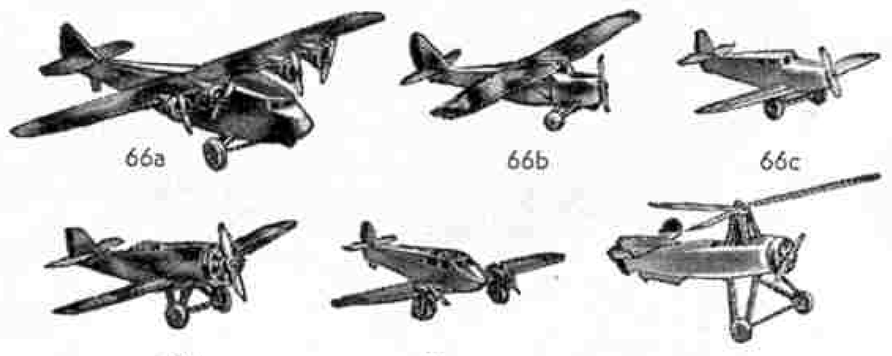


Dinky Toys No. 68

This excellent Aeroplane Set contains an interesting range of British military and civil types, in Service camouflage. On the military side there are the famous "Spitfire" and "Hurricane" fighters. Bomber types represented are the "Blenheim," "Battle" and "Whitley," and the civil aircraft included are the "Ensign" and "Frobisher" liners. Price **10/6**

CAMOUFLAGED AEROPLANE SET



Dinky Toys No. 66

No. 66a	Heavy Bomber	each **11d.**
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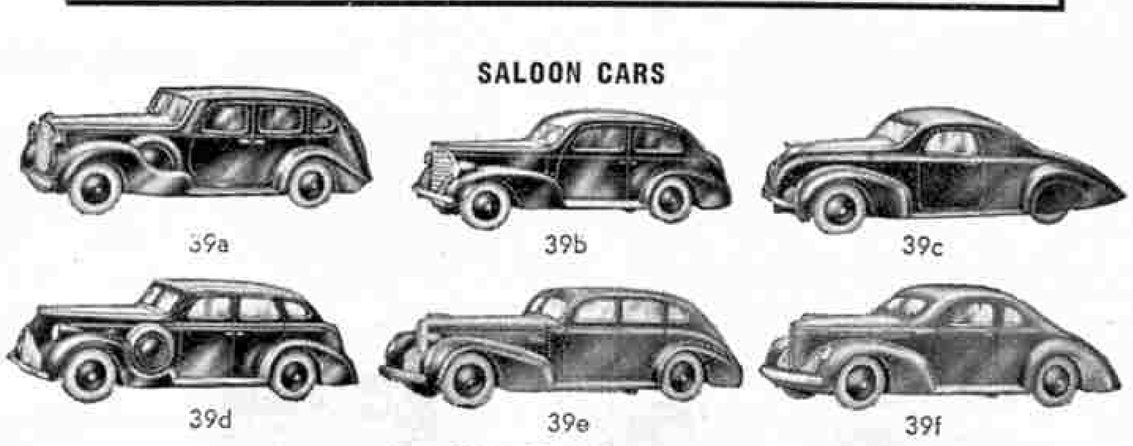
No. 66c	Two-Seater Fighter	„ **7d.**
No. 66d	Torpedo Dive-Bomber	„ **8d.**
No. 66e	Medium Bomber	„ **9d.**
No. 66f	Army Co-operation Autogiro	„ **7d.**

Price of complete set **4/-**

SALOON CARS

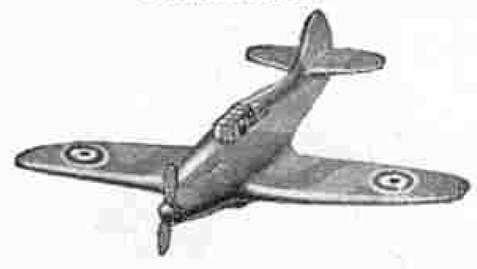


Dinky Toys No. 39

No. 39a	Packard "Super 8" Touring Sedan	each **1/3**
No. 39b	Oldsmobile "Six" Sedan	„ **1/3**
No. 39c	Lincoln "Zephyr" Coupe	„ **1/3**
No. 39d	Buick "Viceroy" Saloon	„ **1/3**
No. 39e	Chrysler "Royal" Sedan	„ **1/3**
No. 39f	Studebaker "State Commander" Coupe	„ **1/3**

Price of complete set **7/6**

HAWKER "HURRICANE" SINGLE-SEATER FIGHTER
(Camouflaged)



Dinky Toys No. 62h

Scale model of the Hawker "Hurricane" single-seater fighter extensively used by the R.A.F. Price **6d.** each

BOEING "FLYING FORTRESS"

Dinky Toys No. 62g

Scale model of Boeing B-17 "Flying Fortress," one of the fastest bombers in the world, and extensively used by the United States Army Air Corps. Price **1/2** each

ARMSTRONG WHITWORTH "WHITLEY" BOMBER
(Camouflaged)

Dinky Toys No. 62t

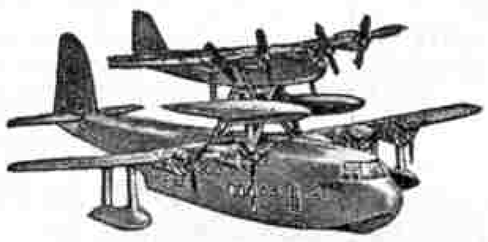
Scale model of the "Whitley" long-range heavy bomber adopted by the R.A.F.
Price **1/3** each

IMPERIAL AIRWAYS "FROBISHER" CLASS LINER

Dinky Toys No. 62w

Scale model of the Imperial Airways "Frobisher" class liner. Three models available named *"Frobisher," "Falcon"* and *"Fortuna."*
Price **1/3** each

MAYO COMPOSITE AIRCRAFT



Dinky Toys No. 63

Scale model of the Mayo Composite Aircraft.
Price **2/6** each

The components of the above can be purchased separately.

No. 63a Flying Boat *"Maia"* ... each **1/6**
No. 63b Seaplane *"Mercury"* ... „ **1/-**

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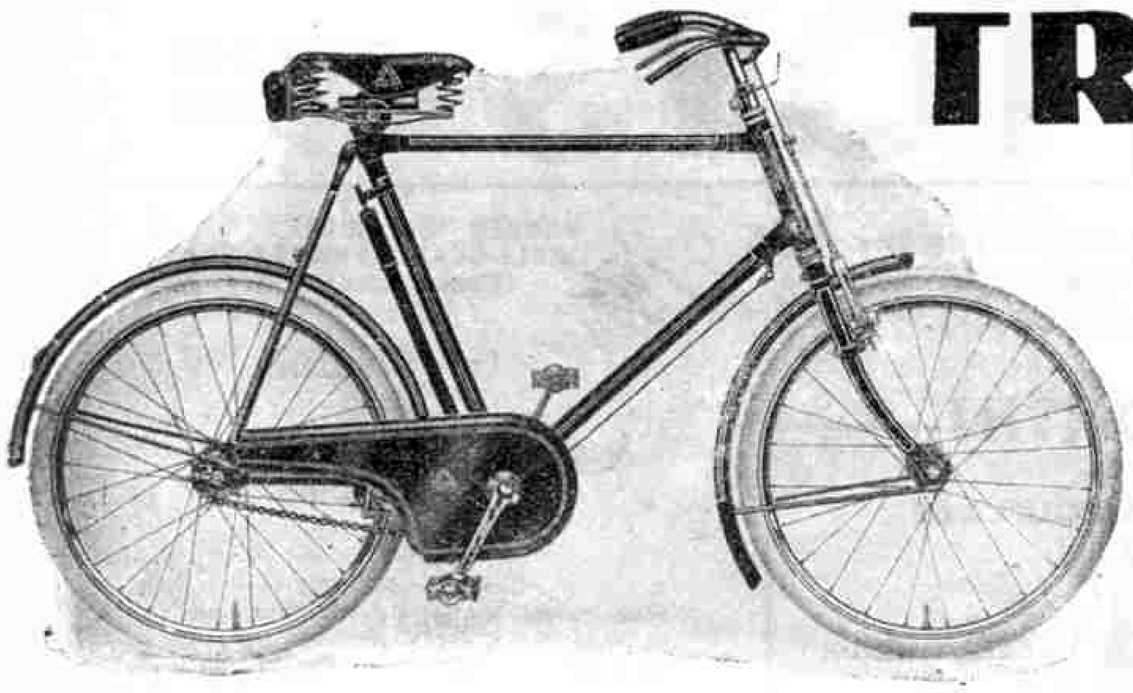

"UNITY" BOY'S CYCLE No. 16 PB

16 in. frame. Finest quality British tube. Wheels 16 in. x 1¾ in. CHROMIUM-PLATED rims. Dunlop pneumatic tyres. Roller lever pattern brakes. Three-coil saddle. ½ in. x ⅛ in. roller chain. Ball-bearings throughout. Complete with equipment and finished in black, blue or maroon. All usual bright parts CHROMIUM-PLATED. Ages 7 to 11.

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Obtainable from all Good Toy Shops and Stores

TRI-ANG TRICYCLE No. E2 (Regd. Trade Mark)

Cycle chain drive with free-wheel. Frame and forks best quality weldless cycle tubing. 16 in. front and rear wheels. 1¾ in. jointless sponge-rubber tyres. Roller lever brake. Ball-bearings throughout. Coil spring saddle. CHROMIUM FITTINGS. Black, blue or maroon.

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ALL TO SCALE CLOCKWORK TOYS

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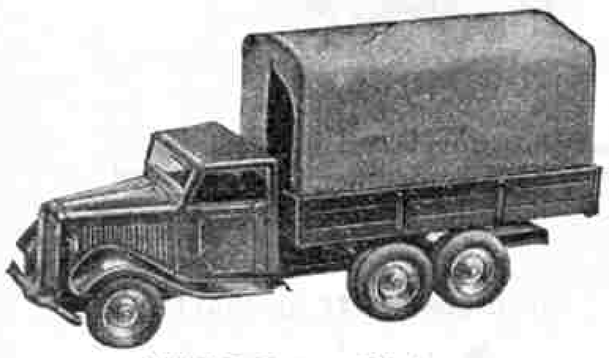
AND NOW!
MINIC SCALE MODEL
BALLOON BARRAGE

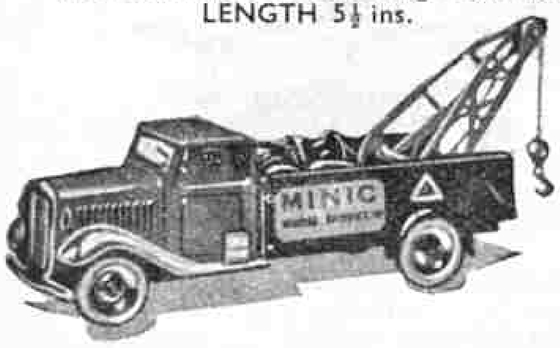
Made up Clockwork Winch Lorry with Gas Cylinder Trailer and Construction Kit for Balloon.

Boxed complete with pulley as illustrated and full working plans and instructions.

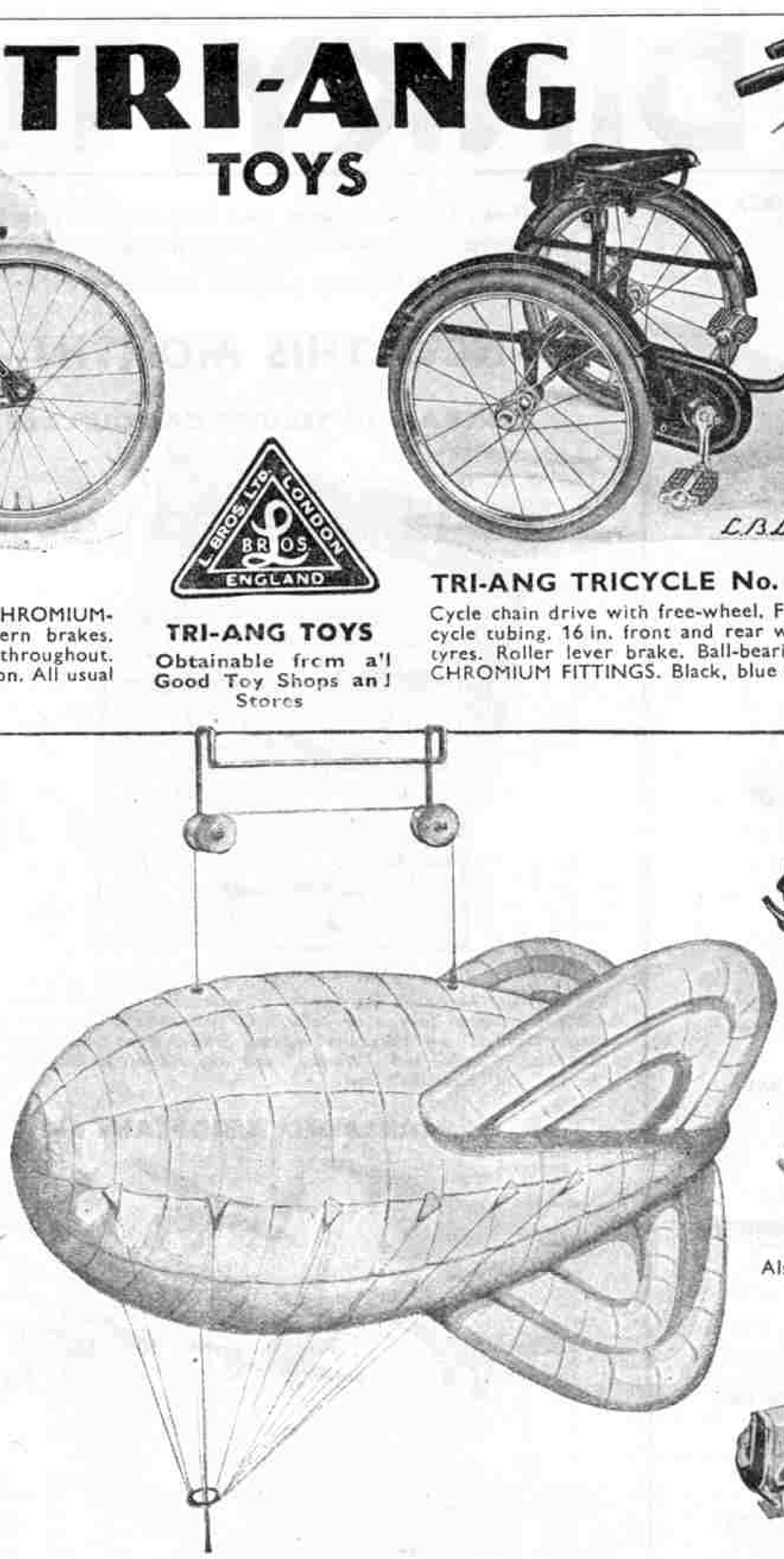
MINIC Six Wheel Army Lorry.
Also obtainable in camouflage colours.
LENGTH 5½ ins.

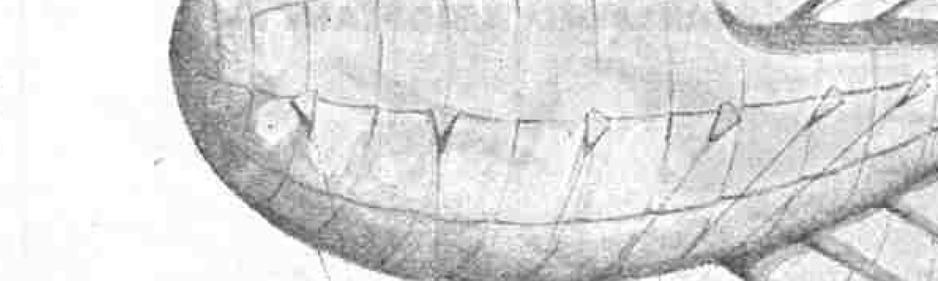


MINIC Canvas Tilt Lorry.
Also obtainable in camouflage colours.
LENGTH 5½ ins.



MINIC Breakdown Lorry.
Also obtainable in camouflage colours.
LENGTH 5½ ins.

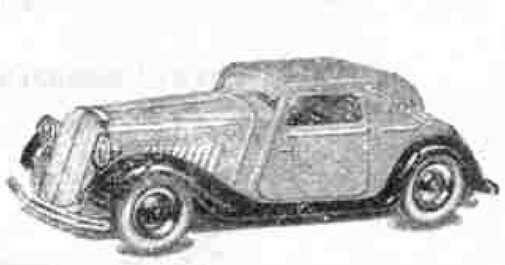




MINIC Scale Model Balloon Barrage
with made up Clockwork Winch Lorry.

LENGTH of Winch Lorry and Trailer 9 ins.
LENGTH of Barrage Balloon 13½ ins. LENGTH of Cable 18 ft.

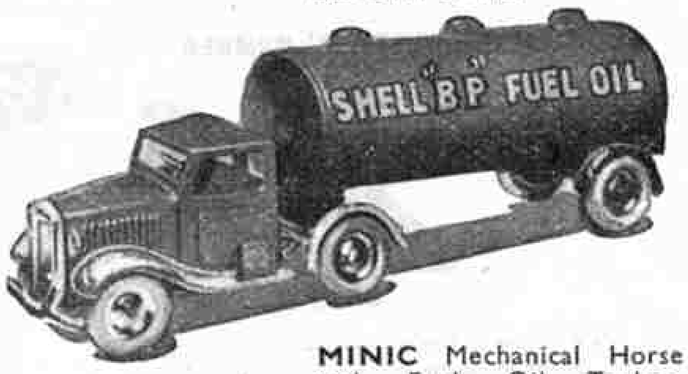
MINIC Traffic Control Car.
LENGTH 7 ins.



MINIC Vauxhall Cabriolet.
Also obtainable in camouflage colours.
LENGTH 5 ins.

MINIC Tip Lorry.
LENGTH 5½ ins.

MINIC Searchlight Lorry
with Electric Searchlight and Battery.
LENGTH 5½ ins.



MINIC Mechanical Horse and Fuel Oil Tanker.
Also obtainable in Pool colour or camouflage.
LENGTH 7 ins.

Made by LINES BROS. LTD., Tri-ang Works, LONDON S.W.19

Next Month: "HOW SCIENCE AIDS THE G-MEN." Publishing Date: 1st August

MECCANO MAGAZINE

Editorial Office:
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Vol. XXV. No. 7
July 1940

With the Editor

The Paper Shortage

As a result of the paper shortage, which is now very acute, it will be necessary after this month to reduce the size of the "*M.M.*" I make this announcement with great reluctance, as I have so many interesting articles in preparation; but I am sure that readers will appreciate the necessity for the reduction, which applies equally to all magazines.

I have not yet decided exactly what changes will be involved. As far as possible all the regular features will be retained though perhaps in slightly shortened form, and of course special articles, such as the splendid one on Artillery by Captain J. E. A. Whitman in this issue, will appear every month. In fact, the old "*M.M.*" will be as interesting as ever, but there will not be quite so much of it.

I shall be glad to receive suggestions from readers as to the things that *must* be included in each month, and those that can be reduced or even be done without entirely during the war period.

I want readers to note specially that, although the costs of producing the "*M.M.*" have risen considerably, *there will be no increase in price.*

I am still receiving moans from readers who have neglected to place a regular order for the "*M.M.*" and as a result have found themselves unable to obtain a copy. Once again I must remind all readers that they can never be certain of securing a copy unless they place a regular order.

I had hoped to publish this month another full-page statement of the "*M.M.*" Radio Fund but unfortunately it was crowded out. It will appear without fail next month. In the meantime I want every reader who has not already done so to send me a contribution.

General Maxime Weygand, Chief of the French General Staff and Commander-in-Chief in all theatres of war.

Leaders in the War

X. General Maxime Weygand

General Maxime Weygand was born at Brussels in 1867. He became a naturalised Frenchman, entered the French Military College at St. Cyr in 1885, and later passed to the Cavalry School at Saumur. He rose by successive promotions to command of the 5th Hussars in 1912, and four years later he became a General of Brigade. In September 1914 he was appointed Chief Staff Officer to Marshal Foch and he played a big part in military operations during 1914–16. In the winter of 1917–18 he became the representative of France on the Inter-Allied War Council at Versailles.

When, in the critical days of March 1918, Marshal Foch was appointed Generalissimo of the Allied Forces on the Western Front, Weygand once more became his Chief of Staff, and showed his skill in large-scale operations.

In August of 1920 Weygand was sent to Warsaw to help the Polish High Command in their seemingly hopeless task of stemming the Soviet invasion. Although the enemy were only 32 miles from the city, he re-organised the Polish Army and launched an offensive with such success that by December the enemy were retreating.

Subsequently Weygand was appointed High Commissioner in Syria at a time of rebellion there, and had further opportunities of showing his great ability as a military organiser. After the present war broke out he was appointed Allied Commander in the Near East. In May last he was recalled to become Chief of the French General Staff and Commander-in-Chief in all theatres of war. In spite of his 73 years, General Weygand is as energetic as a young man.

Gardening Without Soil

Growing Vegetables in Water and Sand

By Harold J. Shepstone, F.R.G.S.

THE latest method of horticulture is growing plants without soil, in sawdust and water. As everyone knows, light, air, water, mineral salts, and a support for the root processes are the requirements of plant growth. Soil is merely Nature's expedient for providing the last three essentials, and it is by no means an ideal medium, subject as it is to such detriments as drought and flood, and garden pests and weeds.

The fact that plants could be grown without soil has been known to experimental botanists for over 50 years. It was not until some 10 years ago however that soil-less culture of plants broke laboratory bounds, and was applied to practical horticulture. It was Dr. W. F. Gericke, of the Agricultural Department of the University of California, who first demonstrated to an astonished world the possibilities of soil-less agriculture, by growing a tankful of tomatoes to such sensational heights that the fruit had to be collected from a ladder. Dr. Gericke gave to the new technique the name hydroponics. The name is derived from the Greek word geoponica, which means the art of the science of cultivating the earth. It is also known as chemiculture, aquaculture, tank farming, tray horticulture, and, more or less facetiously, bath-tub farming.

Many misleading statements and sensational claims were made in the Press for the new form of horticulture. One leading London Sunday newspaper went so far as to declare that it predicted the end of large scale farming; the world's food supply would be grown in a few square miles of mineralised water tanks. All you had to do, according to these writers, was to shake a handful of mineral salts in a biscuit tin to reap a rich crop. Just as successful gardening calls for work and patience, so good crops cannot be raised by the new method without due attention to the necessary requirements.

These fine tomato plants, 15 ft. high, were grown in sawdust and water.

Soil-less agriculture is a practical proposition. Leading experimental stations in this country have thoroughly investigated the possibilities and problems of the new culture. Notable among them are Rothamsted at Jealott's Hill, under the direction of the Imperial Chemical Industries, and the Horticultural Department of the Reading University. The Rothamsted work, which is still being carried out, is virtually a Government undertaking. Many of our leading nurserymen have set up experimental installations, and several horticultural firms are now offering the amateur gardener the necessary apparatus in the form of tanks, boxes, trays, aeration pumps, and the all-essential chemical solution already mixed and ready for use. One London daily newspaper has installed some tanks on the roof of its premises to test whether it is possible for a city dweller without a garden to grow vegetables by the new method on a sunny balcony or in a backyard.

Some reference to the wonderful crops that have been produced under soil-less conditions may prove of interest. At Montebello, in California, Dr. Gericke has for some years past reaped an average yearly crop of 120 tons of tomatoes from 8,000 plants grown in sawdust and water on a third of an acre under glass. The vine reach a height of 15 ft. His last crop brought an average price of 7d. per lb., which works out at £6,250 per acre. Against a crop yield of 116 bushels per acre, tank-grown potatoes have produced a crop equivalent to 2,506 bushels per acre. Equally sensational results have been obtained with flowers. Dormant pruned-back rose trees have been taken indoors in February when the snow was on the ground, replanted in sand and provided with nutrient solution, with the result that within a month or six weeks they were in full bloom.

At Wake Island, a trans-Pacific air-station, some remarkable results have been obtained. This tiny island in the Pacific consists solely of sand and rocky soil, virtually prohibiting vegetation. Here water culture was put into operation, with 120 sq. ft.

Planting tomato plants in sawdust resting on a thin mesh of wire netting, below which is a tank of water, into which the roots grow.

of tanks, and the result has been a weekly production of 33 lb. of tomatoes, 20 heads of lettuce, 20 lb. of string beans, 15 lb. of vegetable marrow, and 44 lb. of sweet corn. The tank area is now to be increased tenfold to enable air liners to pick up vegetable supplies on their journeys over the Pacific. It is an instance of what can be done in similar hot, non-vegetative spots of the Empire, like Aden.

While it is true that more sensational results can be obtained in a warm sunny climate like that of California, most encouraging returns have been obtained in this country. Amateur gardeners in town and country have during the past year or two successfully raised all kinds of vegetables, and also flowers, by the hydroponic method. The principal advantages of the new method are better health of the plants, quicker growth, a more consistent yield, less labour, lower growing costs, and reduced space requirements. Now that we are told to grow our own vegetables as far as we can, these points are not to be ignored.

The new culture can be practised indoors or out. Those competent to judge advise indoor cultivation, preferably in a conservatory or under glass. In its simplest form it can be practised with nothing more than a jam-jar and a shilling's worth of mineral salts. Large flower pots are, however, quite suitable for a variety of plants. Specially-designed pots that permit of easy drainage and provide a device for checking the level of the nutrient solution can now be had.

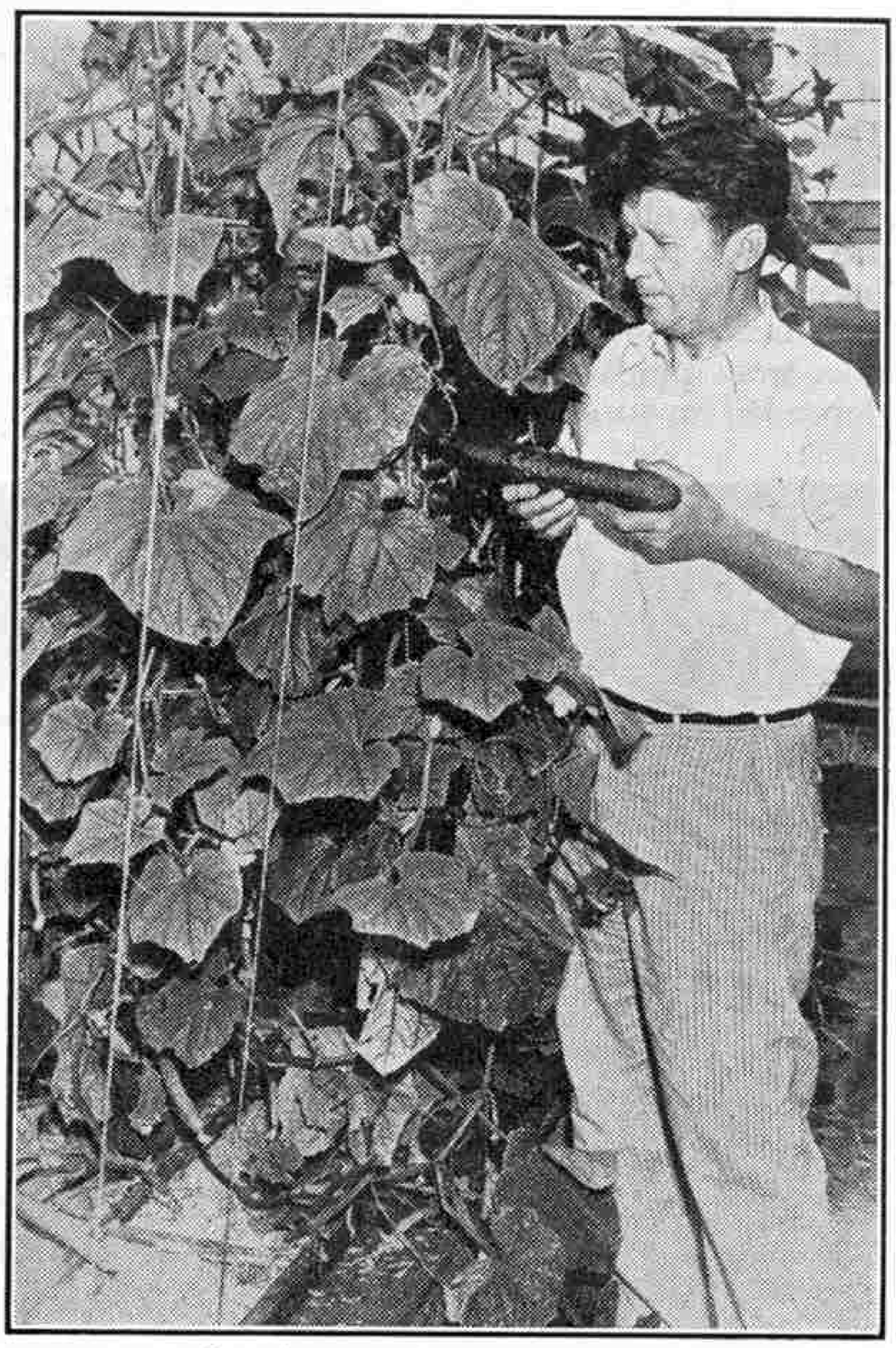
The seeds, cuttings, or plants may be sown in sand, sawdust, or cinders. If cinders are used, they should be first carefully washed so that all the fine material is removed.

The nutrient solution should be given to the plants daily. Many methods for keeping the chemical solution continually percolating through the cinders have been devised, and some experimenters have fixed up a vessel above the level of the pot so that liquid drains through all the time. The solution can be used repeatedly, so that when it is drained off it can be again poured over the cinders.

For those who prefer water-culture a tank and special trays are necessary. The tank may be of many materials, shapes and sizes, but if metal is used it should be painted to avoid chemical action. A very handy tank is one 6 ft. 6 in. long, 3 ft. wide, and 4 to 8 in. deep. Four inches is sufficient for tomatoes, lettuces and string beans, but 8 in. is required for potatoes.

Such a tank should have four trays, resting on battens just above the level of the water. The floor of the trays should consist of half-inch mesh wire netting. This should be covered with a thin layer of excelsior (wood wool), which in turn is covered with sawdust. Seeds are sown in the sawdust or young plants are set in it. The sawdust is kept moist by the nutrient solution in the tank. Aeration of the tank is essential, and cheap aeration pumps can now be obtained. For small tanks, however, sufficient aeration can be achieved by simply paddling the solution for one or two minutes a day, or by pumping air direct through the ordinary short flex of a bicycle pump. If the nutrient solution is heated, quicker crops can be obtained.

Nutrient solutions can be had from the nurseries mixed ready for use; or you can make up your own, and there are several recognised recipes. As in everything else, experts vary a little in the number and quantities of the mineral salts required. Here is a general one that gives very good results. To one gallon of water add the following chemicals—one teaspoonful of saltpetre, one of Epsom salts, two of baking powder (free of alum), one to four of washing ammonia.



Cucumbers grown in sawdust and water.

HOW THINGS ARE MADE:

Writing Ink

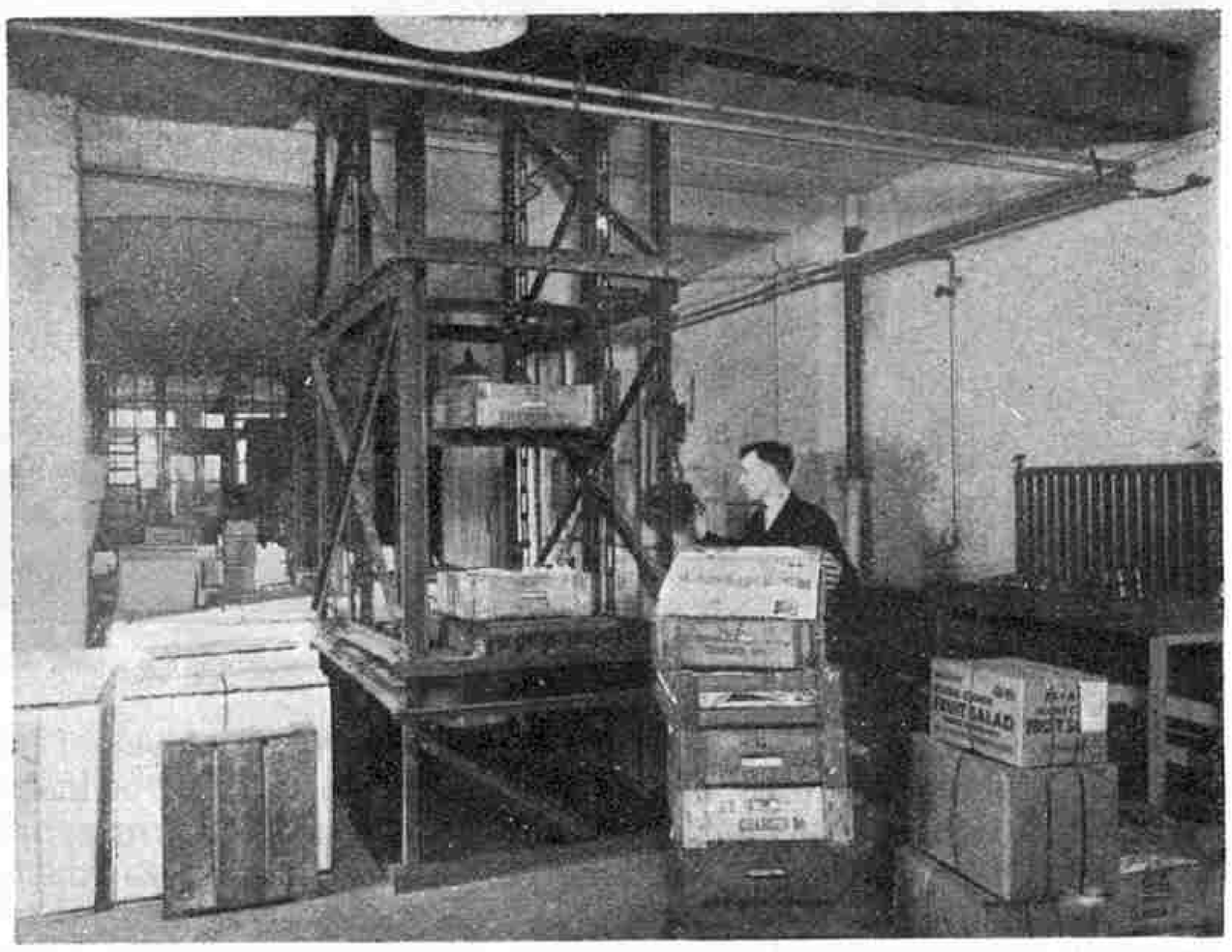
By Alan Williams, M.R.S.T.

THERE are many varieties of ink, with as many different methods of production. This article is confined to the consideration of writing inks, of which, as we shall see, there are also several kinds.

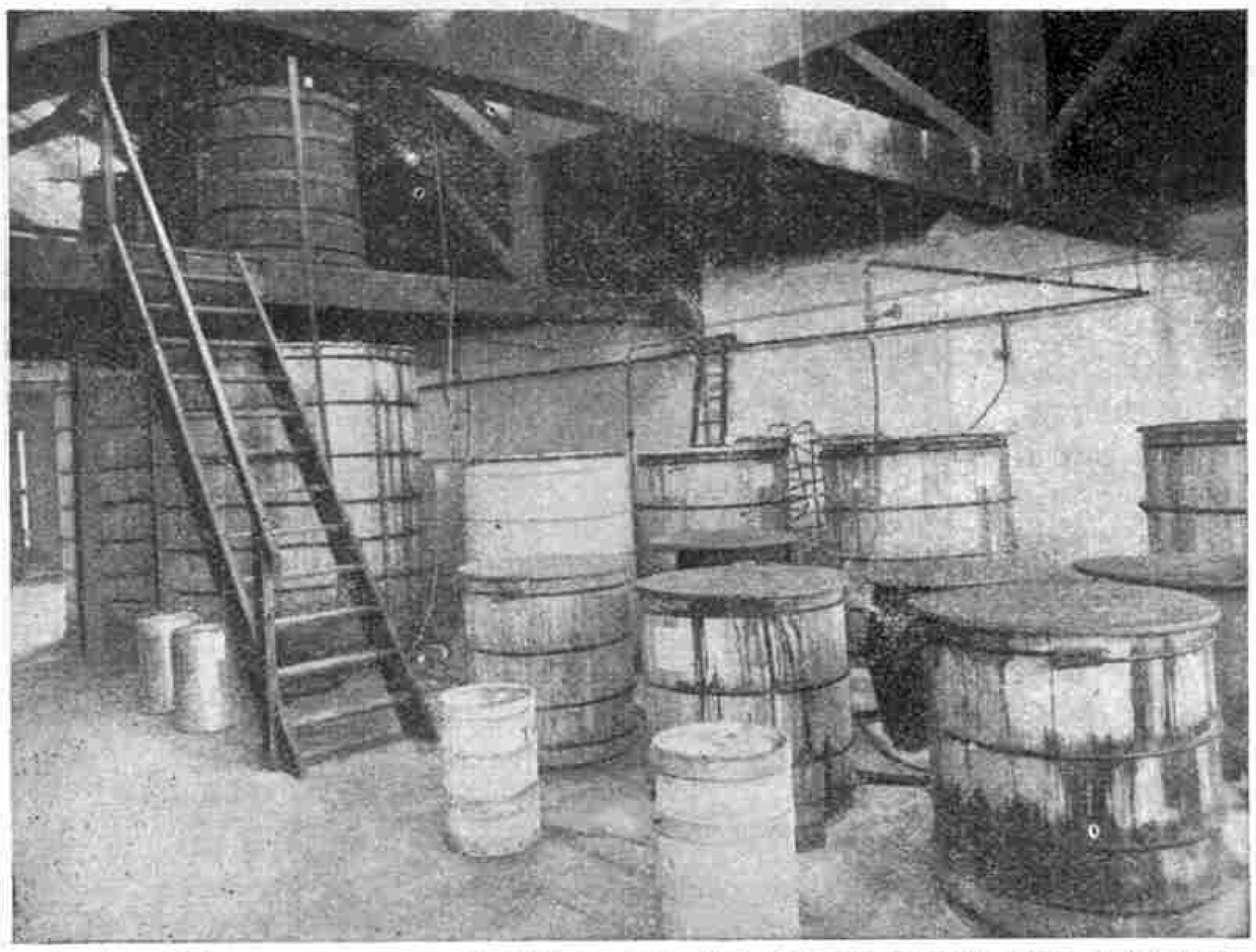
Writing ink depends for its existence on paper or some similar textile; it provides an easy and convenient way of making a mark, more or less permanent, on such a surface. The earliest form of paper was the papyrus of the ancient Egyptians, but they traced their picture-letters on this with a reed pen dipped in pigments more allied to paints than inks, although certain ingredients of the true inks invented later were used also by the Egyptians, notably lampblack.

The problem with most of the early inks was to obtain permanency for the writing. Some of the pigments employed tended to fade on exposure to light and air, but it must be admitted that those used by the scribes of ancient Egypt, together with the inks invented centuries ago by the Chinese and Japanese, achieved a wonderful degree of permanency. These may still be seen with their colours practically as fresh as when they were first applied.

The lasting qualities of old inks made when the secret of permanency was found are certainly a source of wonder. There are in existence legal documents written 800 years ago, whose inks are quite black. A little elementary chemistry will explain why. In the first place these inks are carbon inks prepared from lampblack obtained by burning certain oils in a limited supply of air, and their blackness is therefore in their very composition. Later inks were preparations of tannin, and their blackness depended upon chemical action.



Conveyer on which bottles are sent from store room to filling machine. We are indebted to Waterman's Ideal Fountain Pen Company and L. G. Sloan Ltd. for our illustrations.



Section of the vat-room, where the ink is made. In the background are large storage vats.

It will be seen that writing inks are of two kinds—those that are permanent, known as "record" inks, and those that will fade after the passage of years. Recently there have been added to the impermanent inks a number of coloured inks that cannot resist the action of water, but which are useful for writing and decoration of a temporary character not likely to be exposed to the weather.

The permanent inks rely for their chief ingredients on natural sources. The older kind, now practically extinct, was made from logwood mixed with iron salts, the logwood being prepared from the bark of a tropical tree. While logwood is still widely used as a dye, it is unsatisfactory as an ink because of its uneven flow. This was not so noticeable in the days of quill pens, but is a grave disadvantage in a world where the fountain pen is so universally used.

Tannin inks, of which the well known "blue-black" is an example, are easy flowing. Their basis is tannin prepared from nut-galls, which can be seen in the English countryside as round balls on the twigs of the oak tree and are generally called oak-apples. They are caused by the irritation set up in the tissues when the female gall-fly lays her eggs there. They are of several different varieties and shapes, the oak-apple being only the most common. Those from southern countries contain more tannin than those from the north; they are therefore preferred in ink manufacture, and are imported for the purpose.

The tannin is extracted by crushing and macerating the galls in water; then iron salts are added and the ink is virtually made. That sounds very simple, as indeed it is, but the resulting "ink"

is practically colourless. Write with it on any paper and you would hardly see the result, but the addition of iron salts has the effect of making the tannin turn black on exposure to the air. Unfortunately it is several hours before the darkening process begins to show, and some days elapse before the ink is really black. To enable the writer to see immediately what he is writing a blue dye therefore is added. This eventually fades, but by that time the tannin-iron solution has turned black, a result well known to users of "blue-black" inks, although the cause is perhaps less well known.

Other ingredients must be added to the mixture of tannin, iron salts and dye. The dye tends to mould and the other constituents of the ink are liable to ferment. A small amount of disinfectant therefore must be added, or flakes of scum would be formed and these would adhere to the pen when writing.

Sealing individual bottles on a capping machine.

The ink must be very slightly tacky, too. It must be able to penetrate the surface of the paper on which it is used, and also to break down the thin film of size that covers the paper; otherwise it could be washed off the surface, just as we can wash an ink blot off a piece of glass. At the same time it must not penetrate too well, or it will run along the fibres of the paper and cause what is known as "bleeding." Much of course depends on the resistance of the paper. Newsprint, which is next door to blotting-paper in power of absorption, is easily penetrated by ink, as all will know who have tried to fill in coupons printed on it. Ink penetration depends also on the hardness of the nib. A hard fine steel nib will itself break the surface of the paper, so that more tannin can enter, and thus its use will increase the blackness and permanence of the writing.

It will readily be seen that the manufacturers of inks have some pretty problems to solve in making what at first sight appears to be a simple chemical compound. If there were a standard grade of paper and a standard hardness of nib the problem would be simple, but the ink has to be so mixed that when used with nibs of various degrees of hardness it will penetrate paper of the maximum toughness of surface, without causing "bleeding" in the more absorbent varieties.

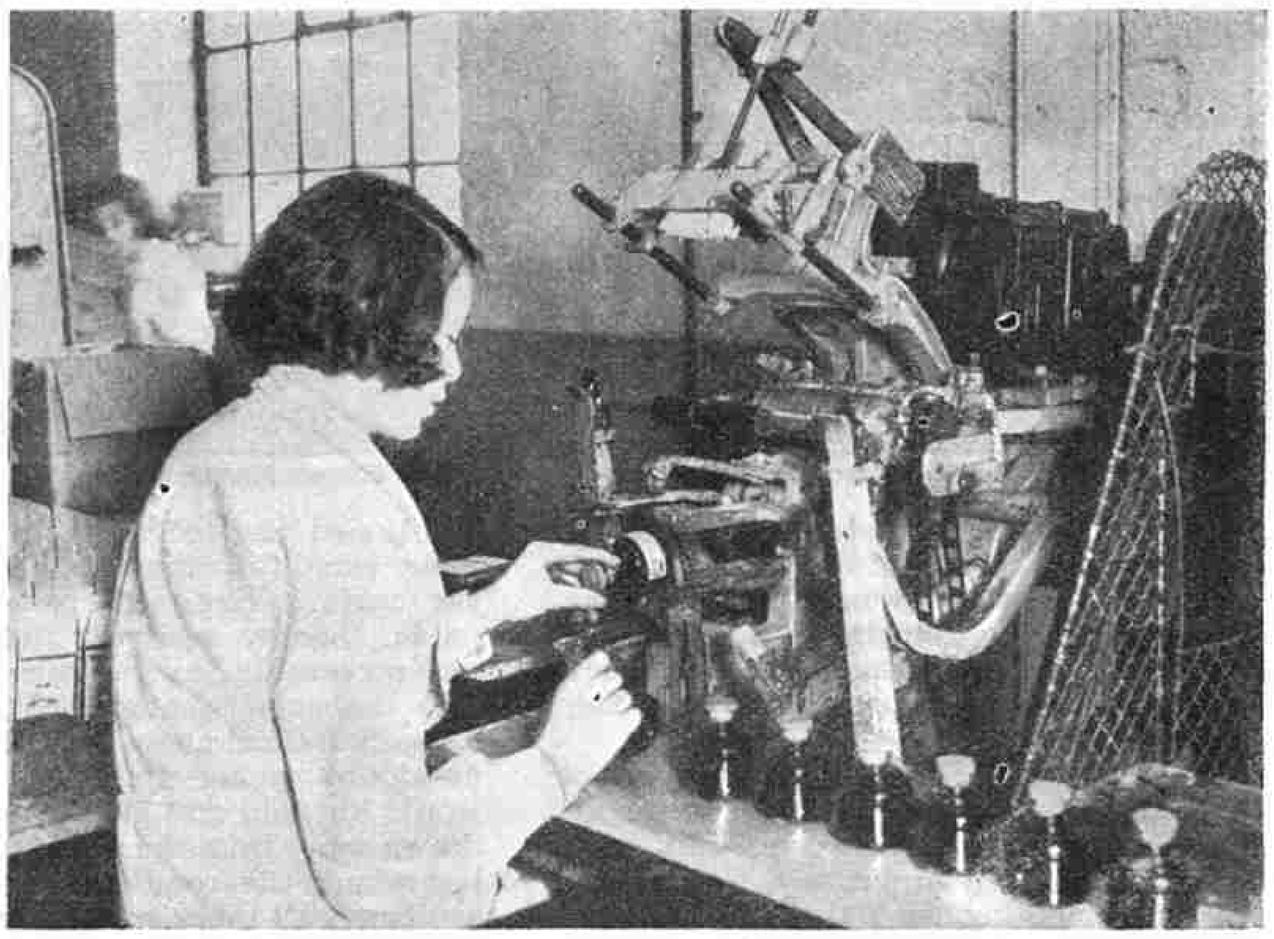
There are even more points to consider. A slight change in the specific gravity of the ink will cause a variation in its flow, with unpleasant results for fountain pen users. Specific gravity is governed by the proportion and mixing of the ingredients, which must be carefully graded and measured to give the best results. This delicate balance may be upset easily, both during and after manufacture.

Possibly the most interesting feature in ink manufacture is the precaution taken to ensure the absence of sediment in the tannin. The steeping of the crushed galls takes place in huge tanks let into the solid earth, in one factory actually into solid rock, to avoid their disturbance. The filling of the bottles is done nowadays with mechanical fillers, which measure out the exact quantities required with the least risk of the inclusion of dust and foreign bodies.

Mention of foreign bodies reminds us that care has to be taken with the ink, even after manufacture, if the best results are to be obtained. One well-known firm recently had a complaint that after half of a gallon jar of ink had been used the ink had suddenly lost its colour. On inspection a pen nib was found at the bottom of the jar. The metal had set up a chemical reaction that caused precipitation of the dye in the ink! On another occasion a sudden epidemic of nib corrosion in a large bank was traced, not to the action of the ink, but to a chemical reaction between the ink and the varnish with which the inkwells at the bank were coated.

As we have seen, it is only when the tannin-iron solution is in contact with the air that any change in colour occurs. Air entering an opened bottle also can cause a deposit to form. Now you can see why school inkwells generally contain such a muddy solution; and the fact that the ink stands in open containers may cast a little light on the proverbial state of Post Office pens.

It is sometimes useful to be able to remove ink marks made in writing or accidentally. Lime and chlorine neutralise the effect of tannic inks, and solutions containing these chemicals are the basis of most ink "eradicators," but the action of the latter is of course considerably speedier. To remove ink from a white fabric, alternate applications of oxalic acid and hypochlorite of lime will be found quite effective. These are unsuitable for coloured materials, however, as they attack the dyes. Pyrosulphite of soda may be used in these circumstances, if care is taken to wash the material well afterwards.



Labelling ink bottles after filling and capping.

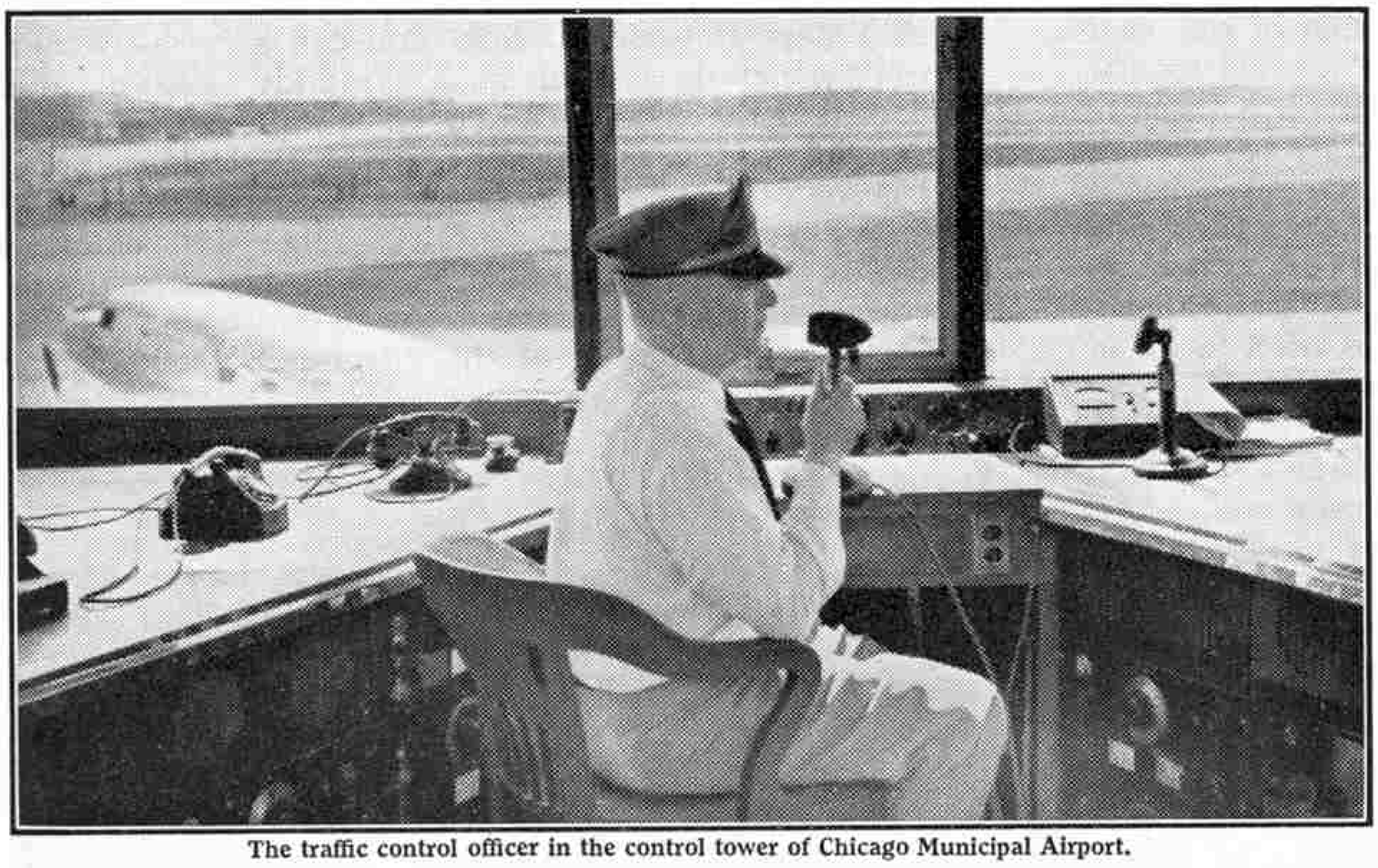
Along American Airlanes

II.—At Chicago Airport

By Edward T. Myers

LAST year I visited Chicago Municipal Airport, a leading one in the United States. Several years had passed since my previous inspection of a large commercial airport, and the changes that had occurred in the interval revived my boyhood interest in flying. Obviously flying had become a serious competitor with other forms of long-distance transport, for it had made possible great saving of time in travel. By streamlined train one cannot cross the United States—3,100 miles by rail—in less than 56 hours, which is well over two days and two nights. Yet by air liner a trip from the Atlantic to the Pacific coast—2,400 miles by air—can be accomplished in one day, or if you choose a sleeper aircraft, in a single night.

Chicago has long been the hub of American railways, and it is making a strong bid for a similar position in air transport. The Municipal Airport deals with about 1,000 passengers a day on the 98 scheduled flights in and out of the city, and



The traffic control officer in the control tower of Chicago Municipal Airport.

air liners can be boarded there bound for any of the four corners of the United States. Like most airports, however, it is at a considerable distance from the business centre of the city, and the air transport companies have to convey their passengers from the city to the airport.

The sequence of events starts when a passenger calls the reservation department of one of the air transport companies, and books a passage by air to, say, New York, which is something like 700 air miles away. This department keeps a complete record of every passenger. It is in two divisions; one sees that a passenger gets to the airport, and the other provides space for him in the desired machine. Of course many passengers reach the airport in private cars, but most of them are conveyed there in the companies' small luxurious buses, which arrive at the airport ten minutes before the liners are due to depart.

At the passenger terminal I saw hundreds of people pouring in and out of the low nautical, fair-like building. Most of them were surrounded with baggage, and clearly were passengers; others were friends and relatives, to see the beginning of a flight. Porters take charge of the baggage while the passengers file into the ticket office. After tickets and baggage have been checked and excess baggage weight paid, the travellers are in the hands of two passenger agents. Alongside the ticket counters is a blackboard bearing the times of departures and arrivals for the flights. From the South, New Orleans, Louisiana, a flight was chalked up as on time and due in 15 min., while the flight to New York City by United Airlines was scheduled for immediate take-off.

The New York flight was called, and the passengers for it assembled at the long canopy that leads out to the aircraft loading gates. There one of the two agents just mentioned assisted them in boarding the liner, while the other stood at the door of the cabin asking each person his or her name, thereby verifying their destination and preventing any passenger from getting into the wrong machine. The stewardess, a young trained nurse, was already aboard, no doubt giving first-flyers a reassuring word. Air mail and air express trucks had drawn away from the aeroplane, and at the last minute the free dinners provided by the company, all prepared and ready to serve, were put aboard the air liner. The doors were then closed. Passengers were now peering out of the windows. The powerful engines were started, and quickly settled down to a steady roar.

A few hours before this the air liner had been thoroughly inspected and made ready by a corps of mechanics. The inspection had ranged from the engines to the retractable landing gear mechanism and the delicate instruments in the cockpit. At the same time another group of workers had cleaned up the machine, and checked the linen and the flight literature in the cabin. When almost through with their task the mechanics had been joined by the co-pilot, who eventually had "accepted" the machine and taxied it from the hangar to the loading gates. The little tractors that grasp the air liners by the tails and haul them into the hangars after a flight are not used for this outward operation. Instead, the aeroplane's own engines and airscrews provide the power for this rather complicated manœuvre.

In the meantime the Flight Captain, or chief pilot, was visiting the company's flight control office, where he carefully analysed the "flight release," which might be compared to the train orders of a railway driver or conductor. It includes complete weather information on the course to be flown, and especially on conditions to be expected at the destination and alternative airports. Other details given range from changes in runway markers to the amount of fuel and oil put aboard his machine.

Next, the Flight Captain drew up his flight plans, using the wind velocities, visibilities, and ceilings given to work out his speeds, altitudes, and schedules along the course. Certain check points have been established by the company, and the pilot indicates the time he expects to pass them. Later he will report by radio the actual time of passing. These flight plans cannot be standardised like a railway timetable, because of the great effect changes in weather have on the aircraft. Thus a pilot must allow for wind velocities, as a head wind will demand more work from his engines; while a side wind will cause an off-course drift that he must allow for in navigating. A tail wind, much desired, will add to his speed and at the same time reduce fuel consumption and engine labour.

When his flight plan was completed, the Flight Captain boarded his aeroplane and made a careful check to be certain that controls and instruments were operating correctly. He tested the radio by conversations with the airport control tower and the company radio station, and then signed the flight release signifying that he found the machine, weather conditions, and himself suitable for flight. If a pilot fails to sign this document the flight is cancelled, as no other pilot is permitted to volunteer to take the machine on the trip.

In order to see how aeroplane take-offs and landings are controlled, I dashed up to the airport control tower, and looking down from the great windows there I watched the co-pilot, 100 ft. below and within the air liner, talk into his microphone, and at the same time heard his voice come from a loudspeaker beneath the control tower operator's desk. The tower is above the passenger terminal and is so situated as to give a clear view of the entire landing ground. Its walls are essentially a series of large windows, and along the row that overlook the landing ground is the operator's desk, on which are wind speed and direction

The pilot and co-pilot in the cockpit of a Douglas transport monoplane of American Airlines, Inc., Chicago, by whose courtesy the photographs on this page are reproduced.

indicators, radio controls, inter-communicating telephones, and a hand microphone. Under the desk are several radio receivers, each tuned to the frequency of one of the companies operating from the airport. For instance, one radio receives all broadcasts from Transcontinental and Western Airlines, Inc., familiarly known as TWA, or The Lindbergh Line; another receives all those on Eastern Airlines' frequency, and so on down the long list of operating companies. Radio equipment in the aircraft provides for broadcasting mainly on the particular company's frequency. On the other hand, the receivers in the machines are pre-tuned to select either the company's frequency or, when near airports, that of the airport control, which is standard in the United States. Provision is made also for receiving the various radio beacon signals.

The co-pilot in the United Airlines "Mainliner" indicated that all was ready for a take-off, and the pilot taxied up to the head of the runway. Just then the operator called over the microphone: "O.K. for take-off, United." The engines roared as the machine made a sharp turn to get on to the runway. There it paused for a moment while the pilot gave each engine full throttle; they roared, and the machine quivered. Then, with brakes released, the liner rushed down the long concrete runway; its tail lifted, the two wheels slowly left the ground, and it began a gentle circle towards the east while gaining height.

Already other aircraft were clamouring for permission to land, and the congestion was so great that the operator in the control tower pushed several keys that apparently cut off certain radio speakers. A voice broken by bursts of static announced that NC 17165 desired to land. Instantly the operator recognised that this aeroplane was a stranger to the airport, and proceeded to give him complete directions: "O.K. NC 17165, land on south-west runway. United plane just leaving south of field. Wind south-west 25–35 miles per hour."

The operator was already giving directions to a second aeroplane when a small machine flashed out of the sky and glided down to the south-west runway. As it was a light machine it came to a quick stop, and turned and taxied up to a hangar; on the wing I saw the number NC 17165.

More voices were coming over the radio speakers, and with the static, which is frequently bad during summer heat-waves, it seemed remarkable that the operator could understand the requests.

Next an American Airlines machine and one belonging to Transcontinental and Western Airlines desired to land. Transport aircraft such as these are large, and as they land at a good rate of speed they have a much greater distance to taxi back than smaller machines. As each air liner landed it taxied across the flying field to the passenger terminal, which this day, as usual, was on the lee side of the field. Attendants there pushed out the portable stairway, placed it against the cabin door of the liner, and soon the passengers were descending to the ground.

Another American Airlines "Flagship" was moving towards the runway. Before gaining it the co-pilot leaned out of the cockpit window and took in the flag. This company believes in carrying out its maritime ideas, even to the point of its "Flagships" of the air displaying flags. Permission was given to take off, and a moment later the big machine rushed across the field and rose slowly. I saw the retractable landing wheels being drawn up as it passed out of sight.

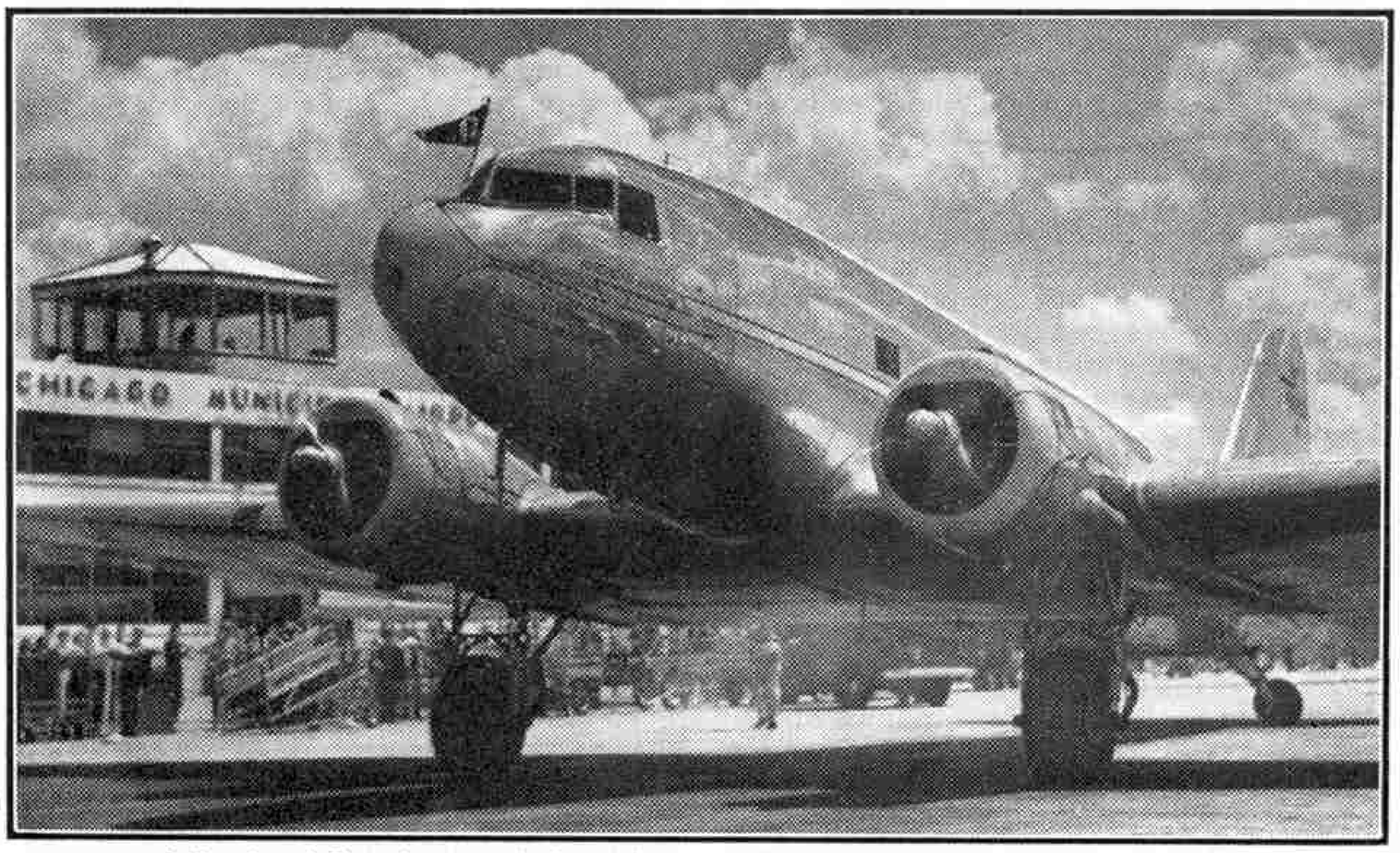
The airport authorities are no longer concerned with the air liner after it has passed the boundary of the airport control. The machine is not forgotten, however, as the owners receive regular word by radio from the pilot, who reports to them his position, speed, and the weather conditions. The company in turn give him the latest weather reports of the road ahead, and any landing information that he might need.

In another room of the terminal building at the airport the Civil Aeronautics Authority keeps track of every aeroplane in flight on the airlanes of the Chicago district. The most conspicuous object in this room is a huge map that shows territory from Pittsburgh on the east to Omaha, hundreds of miles west. On this great table-top map shaded paths indicate the airlane courses marked by red and white beacons, and the positions of machines in flight along these courses are represented by movable metal bars each bearing the trip number, altitude, and "time out" of the machine concerned. Along the walls of the room are blackboards on which the information received every 15 min. from each aircraft is recorded.

Here quiet and efficient men carry out the routine work that safeguards the lives of the passengers aboard the great air liners. In good or bad weather the work goes on, so that the office of the Civil Aeronautics Authority is always ready for any emergency. In heavy weather it is specially important that aircraft likely to meet on a given airlane should be flying at different heights, and the C.A.A. office work in close co-operation with the air transport companies to secure safe conditions. Aircraft crossing an airlane are required to report this act, and those without radio equipment are forbidden to fly within 10 miles of an airlane.

During busy periods aircraft arriving at the airport often have to circle about several times before they are "cleared" to land. When several machines arrive together, only one is allowed to land at a time; the second is cleared from 3,000 ft. altitude to 2,000 ft., while the third is cleared to 3,000 ft. In this way the machines are kept at heights some 1,000 ft. apart.

The weather reports that are so essential to safe flying are gathered together from official reports received from all over the United States. They are then put on the field teletype transmitting system.



A Douglas air liner drawn up in front of the control tower at Chicago Municipal Airport.

With the British Troops in France. A French farmyard with the shelter of its outbuildings makes a perfect emplacement for one of our big guns.

"The Guns Were Active"

By Captain J. E. A. Whitman

DURING the first days of the great battles that have taken place this year, the bomb seemed to have somewhat eclipsed the shell as a weapon of offence; but on the other hand every now and then the communiqué has referred to violent artillery activity. And even when no pitched battle is in progress, the gunner, in carefully-chosen positions facing equally carefully-chosen positions on the other side, can find plenty to do.

"What's on to-day George?" we enquired approaching a six-inch howitzer battery.

"Area strafe," was the cheerful reply. "Been doing several lately. The heads seem to think Jerry is on the move."

In other words, in the sector opposite there is reason to suspect the presence of numerous batteries, ammunition and store dumps; and on the several roads and railways traversing it there has been noticed a certain amount of activity that may indicate that the enemy is getting ready for a forward move. On general principles it has been decided that it would be a good thing to curb these activities a little, and generally cause the enemy a certain degree of annoyance—hence what is called the "Area strafe."

Several batteries of various calibres will be told off for the job. Some will shell front lines and support trenches, not to the degree of intensity attained by a barrage, but sufficiently to make the defenders think twice about putting their heads above the parapet. Other guns will fire steadily at suspected battery positions, dumps and so on, while yet others devote their attention to cross roads, railway lines and junctions. Others again will fire at nothing in particular but will "Sweep and search"—that is, will spray the entire area with high-explosive that may catch parties at work or on the move.

The area strafe may last for a quarter of an hour at an intensive rate of fire, or it may go on for a day in a more leisurely manner. In either case a certain interference with the enemy's activities will be effected, and the road and rail damage caused may hold up his plans for some days.

Such firing is carefully observed from the air and the ground. The enemy's reactions to the "strafe" are noted, such as a working party running to cover, which may confirm previous suspicions of the existence of an enemy battery or some other strong point.

All these reports, together with the shooting logs of each battery, are sent to the Counter Battery Staff for close examination and comparison with aerial photographs, and information from other sources—for instance, the Sound Ranging section. From a prolonged study of all this it presently becomes possible to plot with accuracy the position of most of the enemy batteries. Maps are circulated, and a convenient system of lettering and numbering is adopted so that guns at a given point are indicated as A25 or X27; and by these references they are designated in subsequent orders.

Now certain of our batteries are allocated to each of these targets. In the event of a night alarm or S.O.S. our selected batteries will at once open fire on them; and by compelling them to fire in the direction of our own guns, if they fire at all, rather than on targets they have selected to aid their patrols or local infantry raids, we may upset not merely their plan of attack at the moment, but the greater strategic plan of which it is a part.

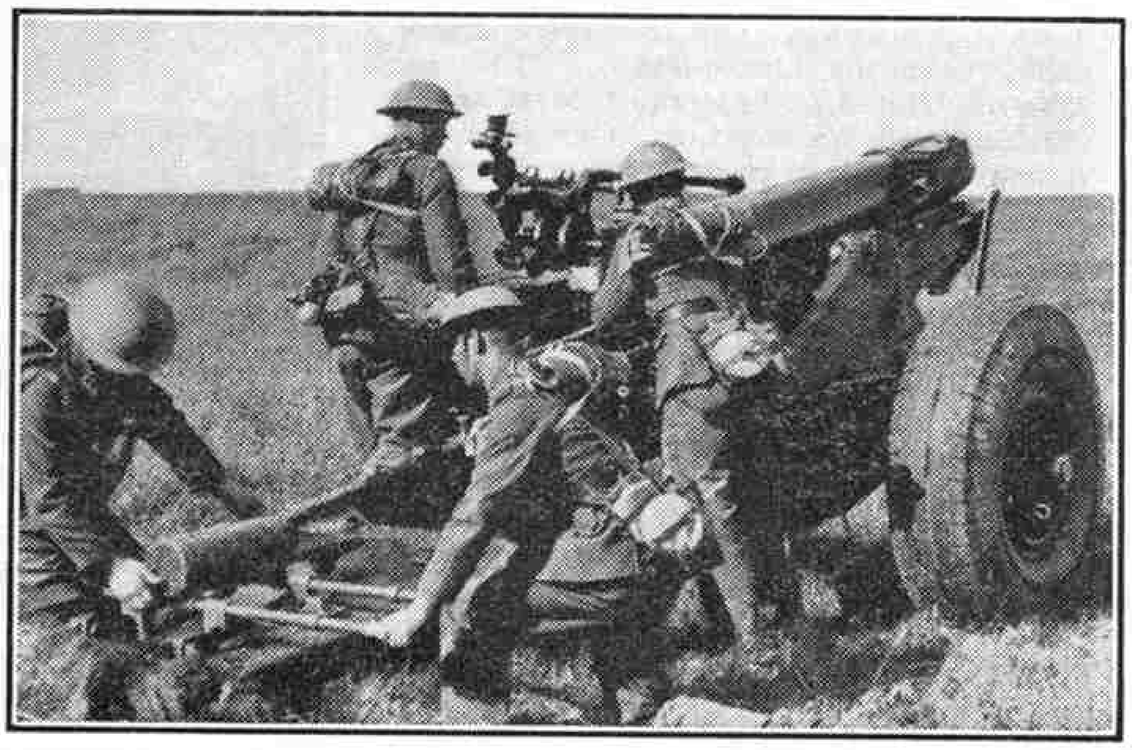
This neutralising fire, as it is termed, is applied during trench raids or when covering working parties; and the targets engaged by our batteries will of course vary with the nature of the operation to be covered. But a further development of this principle is found in what is termed Counter Battery Fire, and in a big action this may be used very intensively.

In this, the object is to ensure that every known battery on the opposing side shall be effectively engaged during an attack by one or more of our own batteries; thus compelling it to answer our fire instead of firing at other points, or better still, silencing it altogether. This last may remain more in the region of things hoped for than actually achieved, but what is attained is fire-dominance; that is to say the enemy fire, if our shooting is good, is rendered irregular and so less harmful.

When the hour for the bombardment strikes, our guns open up, and unless exceptional circumstances cause an alteration in their orders, they continue to fire throughout the day at the batteries allocated to them. If the enemy fire slackens we too may ease up, and perhaps be ordered by Counter Battery Staff to take on a fresh target; but if our old friend re-opens fire we at once resume our firing at him.

It is of course ideal if an enemy battery can be destroyed before the day of battle; hence, when one has been positively located, our guns carry out what is called a "Destructive Shoot." As the term implies, the idea is to smash the enemy battery so that no further action on his part is possible.

The Destructive Shoot is planned and carried out in a very methodical manner. Arrangements are made for observation by air, from ground points in the front lines, and by the Sound Ranging section. Every gun is "ranged" separately—that is to say corrections are applied following the observation of the fall of each shell until each gun is considered to be "on" the target. Then follows a steady fire from all



Gun crew loading the shell on the tray before firing.

the guns of the battery; and at this stage the observers cease to send individual corrections, but report general progress such as a direct hit on a gun, or the explosion of ammunition, etc.

So many rounds are allocated for the Destructive Shoot—say 200 per gun; but they are not all fired off at once. After a while, observers report that the enemy position is wrecked and that the guns are silenced if not destroyed, whereupon the fire ceases for a time. But at intervals throughout the day a few more rounds will be fired with the idea of catching enemy parties who may have returned to try to repair the damage done, or remove the guns.

All these varieties of artillery fire belong to the "quiet times"—that is the period when the armies, while preparing for a forward move, occupy pre-arranged lines and, except for occasional raids to secure information, do not undertake any serious operation. But when the war becomes "active," as was the case immediately after the invasion of the Low Countries, these almost leisurely methods have to be exchanged for more vigorous ones; and a combination of all the forms of fire already mentioned may be simultaneously employed at various points in the course of a single day's work.

The Barrage is the best known of all forms of artillery fire. As its name implies, it is in the first instance a wall of fire formed by exploding shells, and may be applied either as a barrier to the enemy's advance or as a shield for our own.

The barrage was first introduced by the French artillery, but its later perfection is due mainly to the experiments of our own General Lord Horne, a skilled artillerist who commanded one of the main armies during the last war. He invented the "Creeping barrage," in which the line along which the shells explode moves forward or "lifts" at pre-arranged intervals, the rate of the move being calculated to match the rate at which the infantry can advance behind this curtain of fire. In this way the protection of the barrage is assured right up to the moment when the infantry reaches the enemy position and makes its assault.

A variant is the "Box barrage" which, as the name implies, consists in enclosing a given area or position in a rectangle, the shells exploding in front, behind and on each side. Usually this is combined with a destructive fire by the heavy guns into the rectangle thus formed, the object being to destroy whatever is there and at the same time prevent any assistance being brought from the rear or either flank.

The Depth barrage is used when opening a carefully-planned attack. While the lighter pieces put up their wall of fire along the front lines, the heavies will fire systematically at support lines, batteries, roads and railways approaching the front along which enemy reinforcements must come to the aid of the front line.

The development of the battles in Flanders and France, however, seems to have brought with it a revival of something very much like the old Horse Artillery tactics—"fire quickly and move fast." In fact we are back in the stage of cavalry warfare, although the cavalry is now represented by various mechanised troops. The Germans are using these bodies much as they used the Uhlans in 1870—flinging forward a light, swift moving screen which, by reaching towns and villages well in advance of the main body of troops, strike a certain terror. To counteract these tactics the Artillery has similarly modified its own tactics, and its present use seems much more in keeping with the training manuals of, say, 1875, than those of to-day.

One of the B.E.F.'s big guns. A howitzer somewhere in France.

A Divisional Artillery Exercise; field guns in action.

The French 75s are said to have repeatedly engaged the German tanks at 100 yards' range. We may suppose, although we have not been told, that our 25 pdr. Field Gun—the most efficient gun of its kind in the world, has similarly dropped trails, fired off so many rounds "gun fire"—that is each gun firing independently as fast as the piece can be loaded and fired—and then moved on again to repeat the process. Artillery, in this most mobile of wars, has once again become mobile; and there can be little doubt from the reports that have been allowed to dribble through that the tactics born of the old Royal Horse Artillery technique are being used against the Germans with success.

The German use of bomber planes to replace the preliminary long range bombardments of the last war has compelled other changes in tactics. Besides the magnificent work of our R.A.F. in attacking these bombers, our own Anti-Aircraft artillery has ceased to be looked upon as a merely defensive and protective arm, and is now manœuvring and fighting as an integral part of the army, and playing its own particular role in the new battle strategy revealed in the war of movement.

It is not politic to discuss in detail the tactics of the Anti-Aircraft or the Anti-Tank batteries at the present moment. When the story can be safely written it will reveal much of ingenuity and adaptability. But one thing may safely be claimed—whatever problems of fire application the present war may present, the Royal Artillery will solve them speedily and successfully.

RAILWAY NEWS

West of England Express Running

An interesting example of the way in which the war has affected train speeds is afforded by a recent run on the West to North express leaving Plymouth at 3.50 p.m. To Newton Abbot no change from pre-war speed was noticeable at all over the extraordinarily severe gradients of the South Devon line. Here No. 6029 *"King Edward VIII"* had a stiff task with a load of 308 tons tare, and 320 tons gross. Owing to the need for slowing over Tavistock Junction the first 4 miles, out to Plympton, took 6¾ min., and the Hemerdon bank was begun at 50½ m.p.h. Up those 2 miles at the staggering grade of 1 in 42 speed gradually fell to 15½ m.p.h., and a fine acceleration to 50 m.p.h. up the easier, though still reasonably steep miles to Wrangaton summit took the train through Brent, 16.3 miles, in 26½ min. from the start.

A cautious descent of the Rattery incline was followed by a top speed of 59 m.p.h. through Totnes, and then the 4.8 miles up to Dainton summit, concluding with a mile at 1 in 38, took just 7 min.—excellent work. A further cautious descent, followed by a dead slowing for underline bridge repairs, brought the train into Newton Abbot in 49¾ min. from Plymouth, 31.8 miles. Here *"King Edward VIII"* came off, and was replaced for the run to Bristol by No. 6023 *"King Edward II."*

The run along the coast to Exeter, along that winding, fascinating sea wall between Teignmouth and Dawlish, was smartly done at pre-war speed, the 20.2 miles taking just 26 min., with a maximum of 61 m.p.h. on the final "straight" past Exminster. At Exeter the load was increased to 390 tons, and some first rate climbing was made up the gradual ascent of the Exe valley. Speed was 53 to 54 m.p.h. most of the way. Tiverton Junction, 14.9 miles, was passed in 19¼ min., and the engine was going so well up the final 1 in 115 to Whiteball summit that Burlescombe, within a mile of the top, was passed at 46 m.p.h.

Then came a bad slowing for track repairs to 25 m.p.h. Nevertheless Whiteball box, 19.9 miles, was passed in 25¾ min. Down the Wellington bank was recorded the only slight excess over the wartime speed limit, a short spell at 67 m.p.h. So after passing Norton Fitzwarren, 28.8 miles, in 35¼ min. Taunton, 30.8 miles, was reached in exactly 38 min., which was the normal start-to-stop timing before the war. The present schedule is 40 min.

Only on the last stage, with load reduced to 325 tons, was the slowness of present-day express running to be seen. The line to Bristol is almost dead level throughout, but even though leaving Taunton 3 min. late the most sedate running followed. Keeping just inside the 60 m.p.h. limit No. 6023 passed Bridgewater, 11.6 miles, in 14¾ min. and Yatton, 32.8 miles, in 36¼ min., reaching Bristol, 44.8 miles, in 55½ min. after three slacks in the last 10 miles. Net time was only 50½ min., giving an average speed of 53½ m.p.h., with speed at no time exceeding 60 m.p.h. The arrival in Bristol was 2¾ min. early.

O. S. Nock.

Off the Beaten Track

A number of interesting instances have recently been reported of engines of unusual types seen at work on various parts of the four British railways. A Coventry reader writes to say that on three occasions since last August he has seen L.M.S. 4–6–2 express engines, of streamlined and unstreamlined varieties, passing his city in the course of diversion via Stechford and Stafford from the main Trent valley route between Euston and Crewe, because of a mishap blocking the main-line, or of floods. These Stanier Pacifics have also begun working between Crewe and Holyhead.

Freight engines of the 0–6–0 tender types originating on the various component lines are being interchanged much more than usual between sections of the L.N.E.R. to meet wartime requirements. In view of the rapid increase in the stock of "Green Arrow" mixed traffic locomotives ex-Great Northern type 4–4–2 and "K3" 2–6–0 engines have been distributed to a number of the smaller sheds not hitherto boasting such large engines. There is thus considerable interest in the British locomotive world in that respect at present, even if some other features are dull.

Wartime "Surprises"

Despite the withdrawal or curtailment of so many normal activities beloved of the railway student, war conditions provide plenty of fresh opportunities for the enthusiast to develop his faculty of interest and powers of observation. For instance, the adjustment of motive power to meet altered flows of traffic has brought new types of locomotives to various districts, duties allocated to the different classes of engine have been re-shuffled, and so on. Who would have thought before the war to see a train of L.N.E.R. coaches being hauled out of Euston Station by a former Midland Railway 4–4–0 engine? Yet this surprising spectacle has been a frequent if not everyday feature since sleeping-car trains of L.N.E.R. stock have been run over the L.M.S. line between Edinburgh and Euston, and vice-versa, to relieve the pressure on parts of the East Coast route. After arrival at Euston the empty train is hauled out to Willesden Carriage Sidings, and it was on this duty that ex-M.R. "Class 2" 4–4–0 No. 425 was recently seen engaged.

Ex-L.B.S.C. "Atlantic" No. 2422 "North Foreland" on the down Newhaven Boat Train at Victoria Station. Prize-winning photograph by J. Taylor, Beckenham.

The use by the G.W.R. of numbers of L.M.S. and L.N.E.R. goods locomotives to replace their own 0–6–0's sent overseas is another example of fresh interest imparted by the war. The multiplicity of through stock-workings on special trains between one system and another afford still further material for the observer. In the course of his travels the railway enthusiast, who is naturally alert to observe anything out of the ordinary on our "Lines Behind the Lines," is bound to witness movements or workings which, however interesting, are best not broadcast even amongst friends. All who are interested in railways should remember that: *"Careless talk may give away vital secrets!"*

D. S. Barrie.

G.W.R. Locomotive News

During a recent period up to 4th May the following new engines were turned out from Swindon: 2–8–0 Nos. 3815–22; 2–8–0T No. 5264; 0–6–0T Nos. 3367–74. One engine condemned was 0–6–0T No. 806, formerly No. 7 of the Rhondda and Swansea Bay Railway in South Wales.

Derby Railway Works Centenary

Derby celebrated its centenary as a railway manufacturing town on 11th May, the 100th anniversary of the establishment there of what are now the L.M.S. Railway works, one of the largest centres in the country for the manufacture and repair of locomotives, carriages and wagons. To-day the works cover a total extent of 175 acres and give employment to more than 8,000 people. Originally they comprised a small group of buildings for the use of the North Midland and Midland Counties Railways, which with the Birmingham and Derby Junction Railway shared the use of Derby passenger station, opened at the same time as the works. The North Midland Railway, engineered by George Stephenson, was opened from Derby to Rotherham, with connection from the latter place to Sheffield, on 11th May 1840, while the Midland Counties Railway, which had been opened from Nottingham to Derby in the previous year, was extended to Leicester on 4th May 1840.

The first Locomotive Superintendent at Derby was Robert Stephenson, son of "the father of railways." He held office on behalf of the North Midland Railway from 1841 to 1844, when the whole of the railway establishment at Derby came under the ownership of the Midland Railway, which was formed in that year by amalgamation of the North Midland, Midland Counties, and Birmingham and Derby Junction Railway.

During the past 100 years the works have been several times enlarged and modernised to meet increasing demands, the most extensive alterations being those of 1873, when the locomotive and carriage works were separated and re-equipped throughout.

Despite successive modernisations, some of the original enginehouses and other buildings are still in use for various purposes, but the most historic relic connected with the works is the bell turret clock in the Locomotive Offices, which bears the date 1717 and is still in use. It is believed that this bell was taken from the old St. Pancras Chapel, London, when this was demolished about 1865 in connection with the building of St. Pancras Station. The clock itself is 100 years old, and every care is being taken by the L.M.S. authorities to keep it in good working condition for ultimate preservation as an historic relic.

Enter the "Evac"

War-time has brought a fresh addition to the railwaymen's extensive vocabulary relating to special trains, which already includes such portmanteau words as "Emcar" for empty stock train, "Evex" for evening excursion, "Garex" for guaranteed excursion, and so on. The addition, as yet unofficial, is "Evac," by which railwaymen describe the "evacuation specials" run to evacuate schoolchildren and others from vulnerable areas.

The working of these trains, too, has produced some interesting special features, such as the situation whereby two trains, each conveying evacuated school-children, were recently seen in the same station but facing in opposite directions, although both were proceeding to safety areas. Moreover, although the station was an L.M.S. one, the L.N.E. and Southern Railways respectively supplied the coaches for the two trains concerned! This paradox happened at Bletchley and is simply explained. The train of S.R. coaches was northbound down the main line, having been exchanged to the L.M.S. in the London area, while the train of L.N.E.R. coaches was one of nine "evacs" conveying children from East Anglia to stations on the Great Western Railway via the L.M.S. Cambridge and Oxford line. Although the general direction of this route is east and west, trains bound for Oxford pass through Bletchley in a north-to-south direction. Generally speaking these nine trains consisted of 14 L.N.E.R. coaches, with a weight of about 400 tons each, and they were hauled between Cambridge and Oxford by L.M.S. "Moguls" representing both the parallel and taper-boilered series.

D. S. BARRIE.

"A1" class "Pacific" No. 4473 "Solario" on the G.C. Section of the L.N.E.R. This photograph, by K. Oldham, Hyde, shows several of the gantries erected for the overhead wires for the electrification that is to be carried out between Manchester and Sheffield.

L.M.S. Locomotive Stock Alterations

During the four-weekly period ended April 29th 1940 six new engines were put into traffic. Two of these were built at Crewe. They were Class 7 4–6–2 passenger tender engines Nos. 6240 *"City of Coventry"* and 6241 *"City of Edinburgh."* The others were Derby engines, Class 4 0–6–0 freight tender engines Nos. 4598, 4599, and 0–6–0 heavy oil engines Nos. 7093 and 7094.

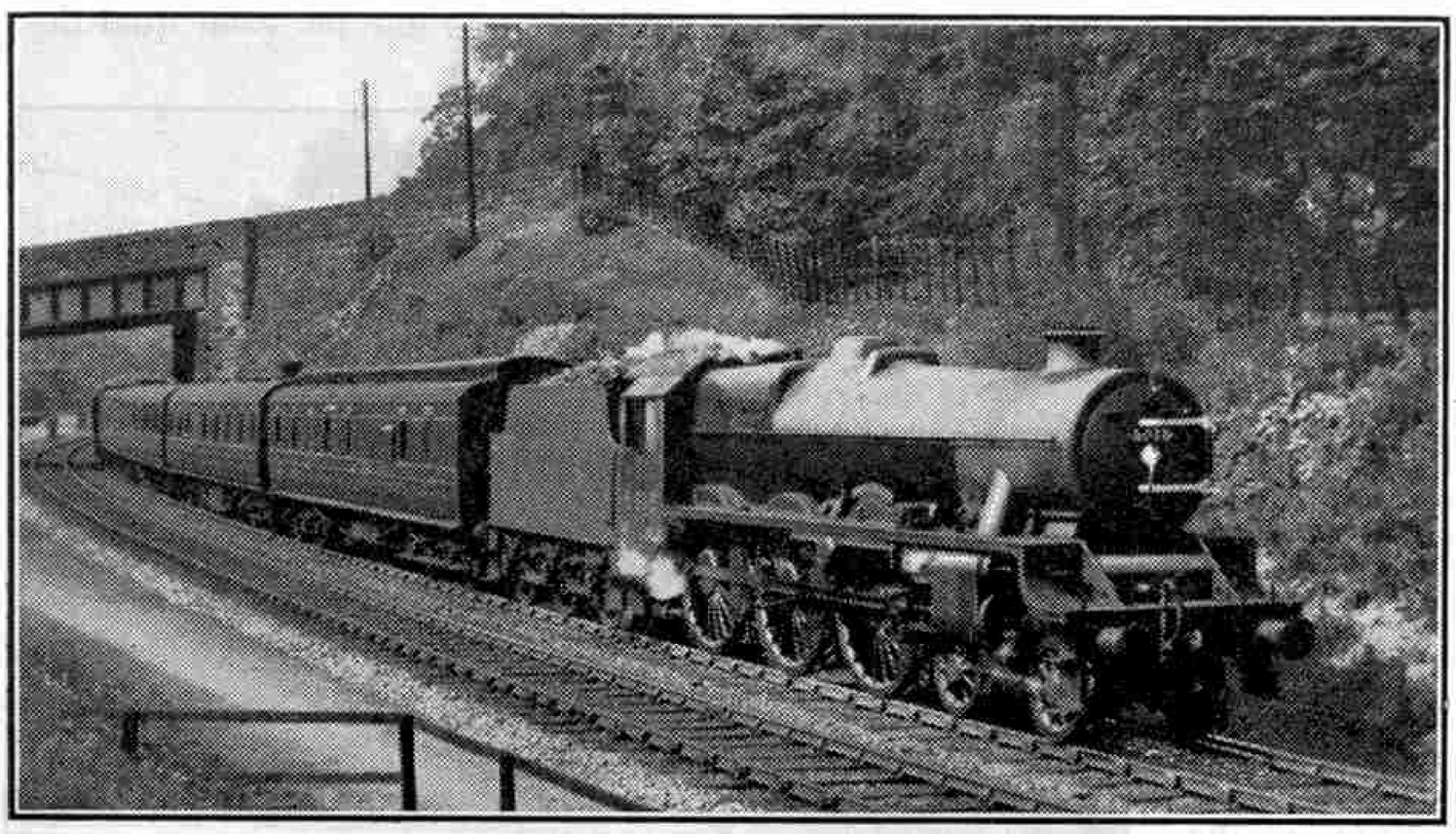
In the same period 10 engines were condemned. They included former Midland Railway passenger tender engines Class 3 4–4–0 Nos. 773 and 774 and Class 1 2–4–0 Nos. 20251 and 20266, and the former L.N.W. Class 3 4–4–0 No. 25188. No. 2518 is the "Precursor" class engine *"Marquis,"* which 30 years ago ran over the G.N. for some weeks in exchange for Ivatt 4–4–2 No. 1449, loaned to the L.N.W. Other engines condemned were ex-L. and Y. Class 2 2–4–2Ts Nos. 10805 and 10858 and ex-Midland Class 1 0–4–4T No. 1327, with the 0–6–0 freight tank engines Class 2 Nos. 27351 and 27384 of the former L.N.W.

Alterations also were made in the power classification of certain locomotives.

"Pacifics" on the G.C. Section of the L.N.E.R.

Since the first tentative use of the "A1" Pacifics of Doncaster origin on the Great Central Section of the L.N.E.R. the number of these engines that I have observed on that Section has greatly increased. Even the famous No. 4472 *"Flying Scotsman"* has been seen recently on a freight train going towards Manchester, and I have been told that No. 4477 *"Gay Crusader"* also has been seen on goods work. In addition to these quite a few of the *"A1s"* formerly familiar on the King's Cross main line seem to have migrated to the Marylebone route, including the pioneer Gresley "Pacific" No. 4470 *"Great Northern."* Others are No. 2550 *"Blink Bonny,"* No. 2552 *"Sansovino,"* No. 2554 *"Woolwinder,"* No. 2558 *"Tracery,"* No. 4473 *"Solario,"* which is shown in the accompanying illustration, No. 4474 *"Victor Wild,"* which in 1925 ran on the G.W.R. in competition with a "Castle," and No. 4478 *"Hermit."* Presumably weight restrictions prevent the use of the "A3" class although no doubt there is plenty of work for these engines on the East Coast Route and in Scotland.

K. OLDHAM.



L.M.S. "Jubilee" No. 5615 "Malay States" on a Derby train passing Dore (South). Prize-winning photograph by C. Spencer, Sheffield.

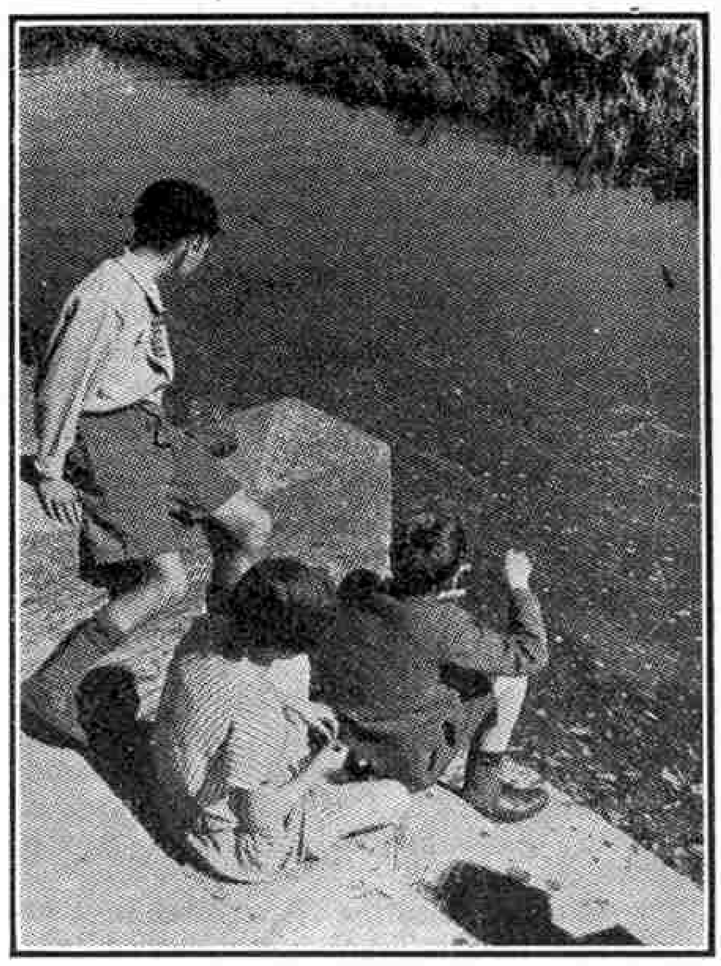
PHOTOGRAPHY

Series Pictures that Tell a Story

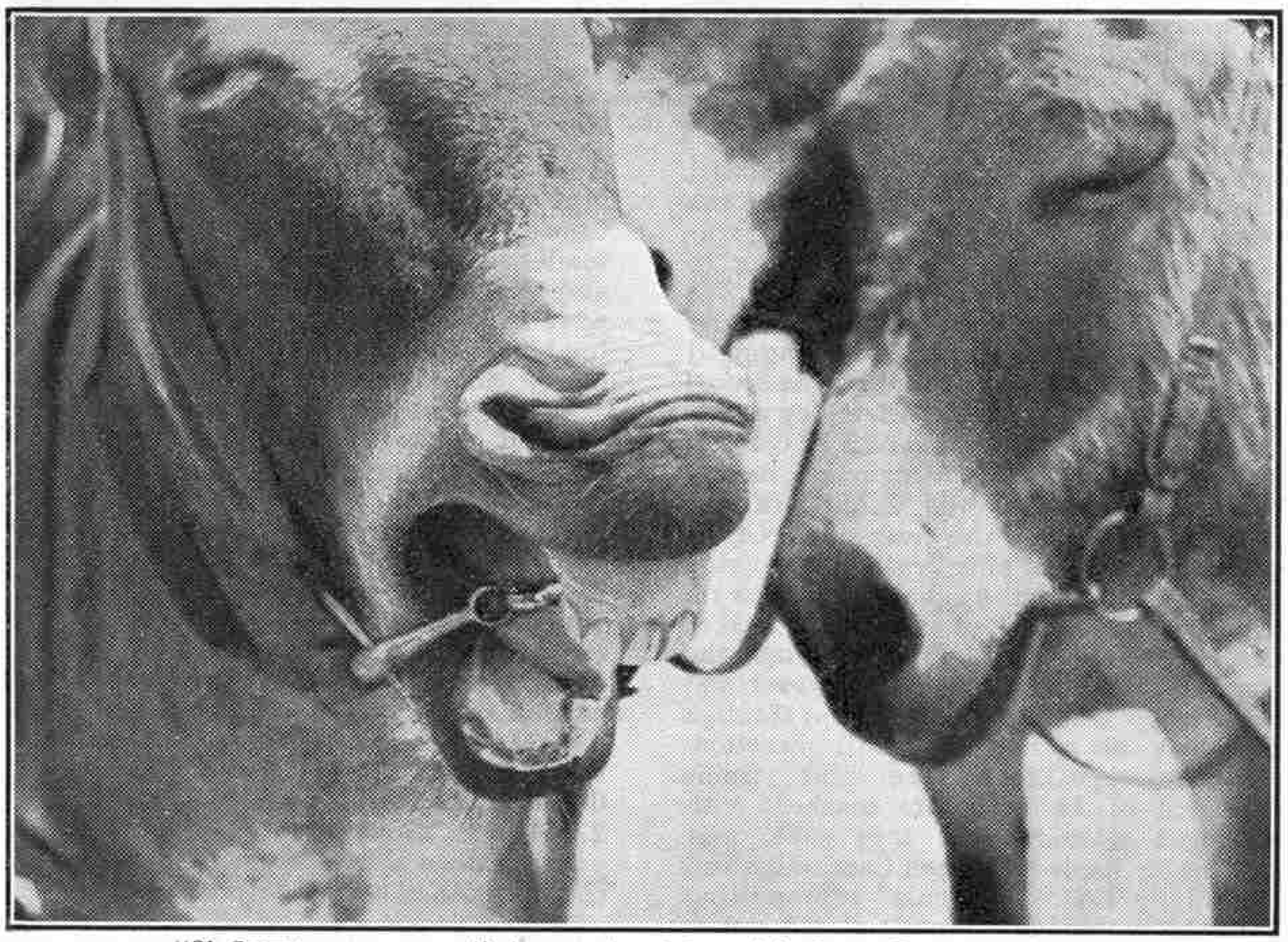
WHEN I turn over the pages of the albums that represent the photographic efforts of my friends, I am often struck by what I might call their scrappiness. Each print seems to represent an isolated scene or incident; there is no link or connection between them. The result is that, however good the individual prints may be, we soon get tired of looking at them. The effect is quite different when the album contains groups of prints each dealing with one type of subject. Such groups interest us because they tell a story.

Most people begin their photographic operations by taking snaps at a furious rate of friends and relations, pets, the house and garden and so on. This is great fun for a while, but after a time the subjects ready to hand seem to be exhausted, and the hobby begins to lose its interest. My correspondence shows that many readers have reached this stage, and the object of this article is to suggest one way to revive interest and secure pictures that will give pleasure for a long time to come.

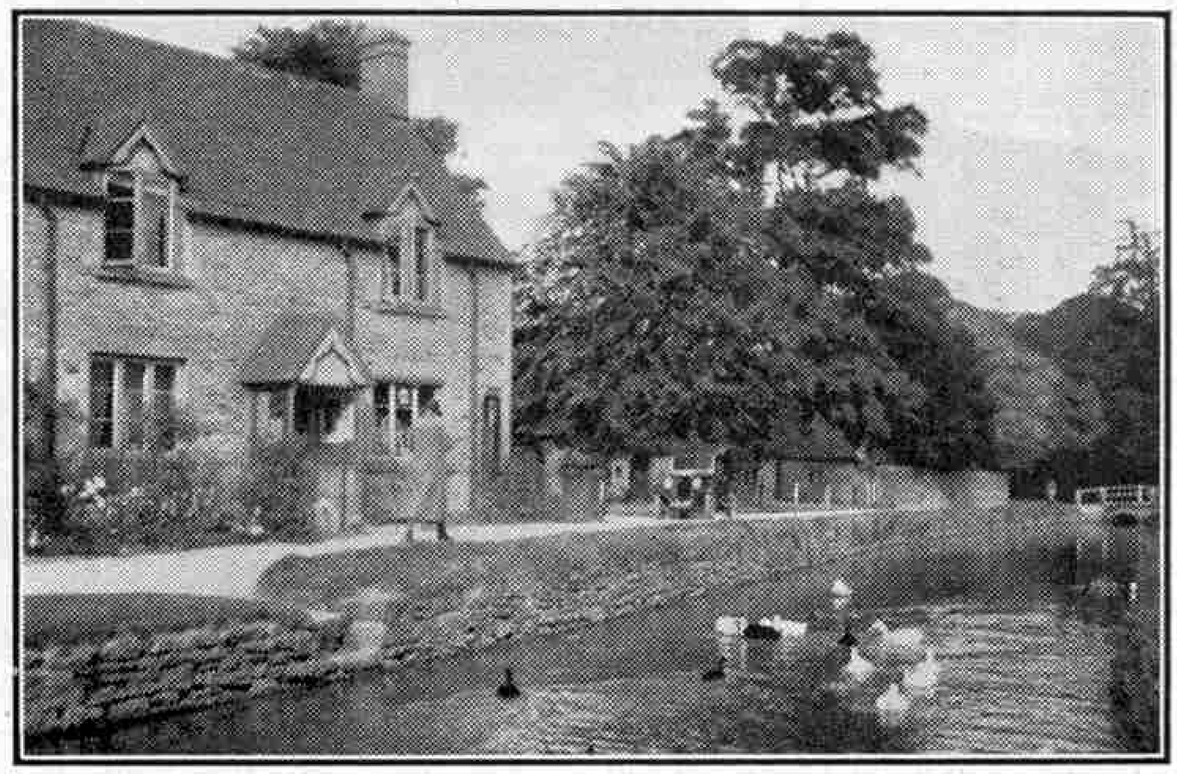
The idea is to choose an interesting subject, and take a series of photographs of it that link up to form a more or less continuous story. This does not mean an attempt to rival a cinema film. A series of even half a dozen well chosen snapshots will provide lots of real fun. One of my own happiest hunting-grounds for photographs is a small farm near my home, and there I have been able to make a most interesting series of photographs illustrating such topical farming activities as hay-making, harvesting, butter-making, etc. Under each of these headings I have made many different exposures. For instance, my set of prints illustrating hay-making comprises more than 20 separate pictures taken on many different occasions. One print shows the uncut hay-field photographed through an archway of overhanging trees, with the farmer and his dog occupying a prominent place in the foreground. Then there are pictures of the mowing machine in action, followed by the workers with their rakes, others piling the hay, and a jolly snap of the men enjoying a well-earned break and refreshment in a shady corner. Other pictures taken a few days later show the hay lorry being loaded ready for filling the barn. There is plenty of action in all these pictures in addition to their pictorial qualities.



"Fishing," by J. R. Tottle, Taunton.



"Oh George, you are a one!" An amusing photograph by James Hampson, Edgware.

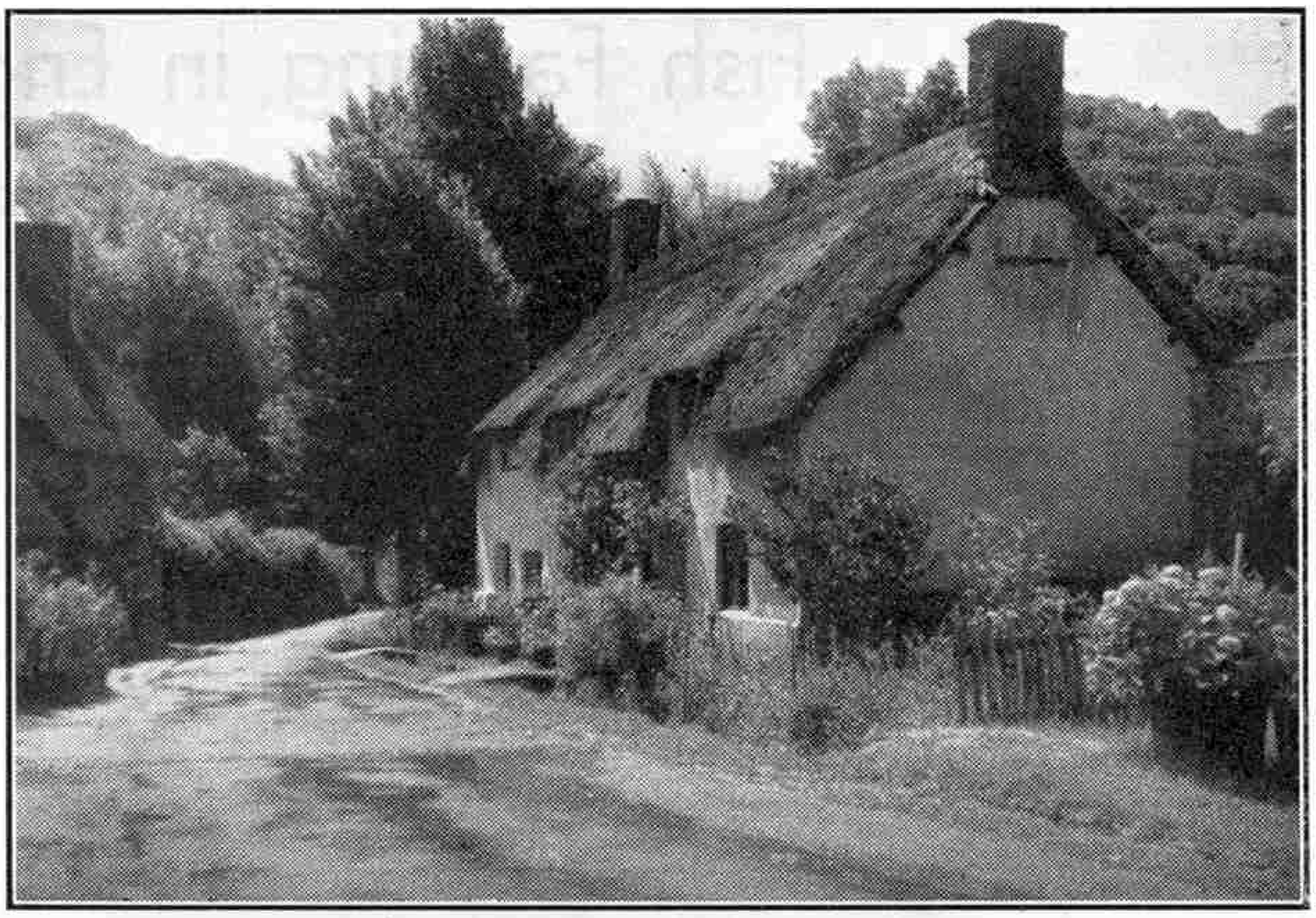


A scene in a Cotswold village, by F. H. Culverhouse, Sheffield.

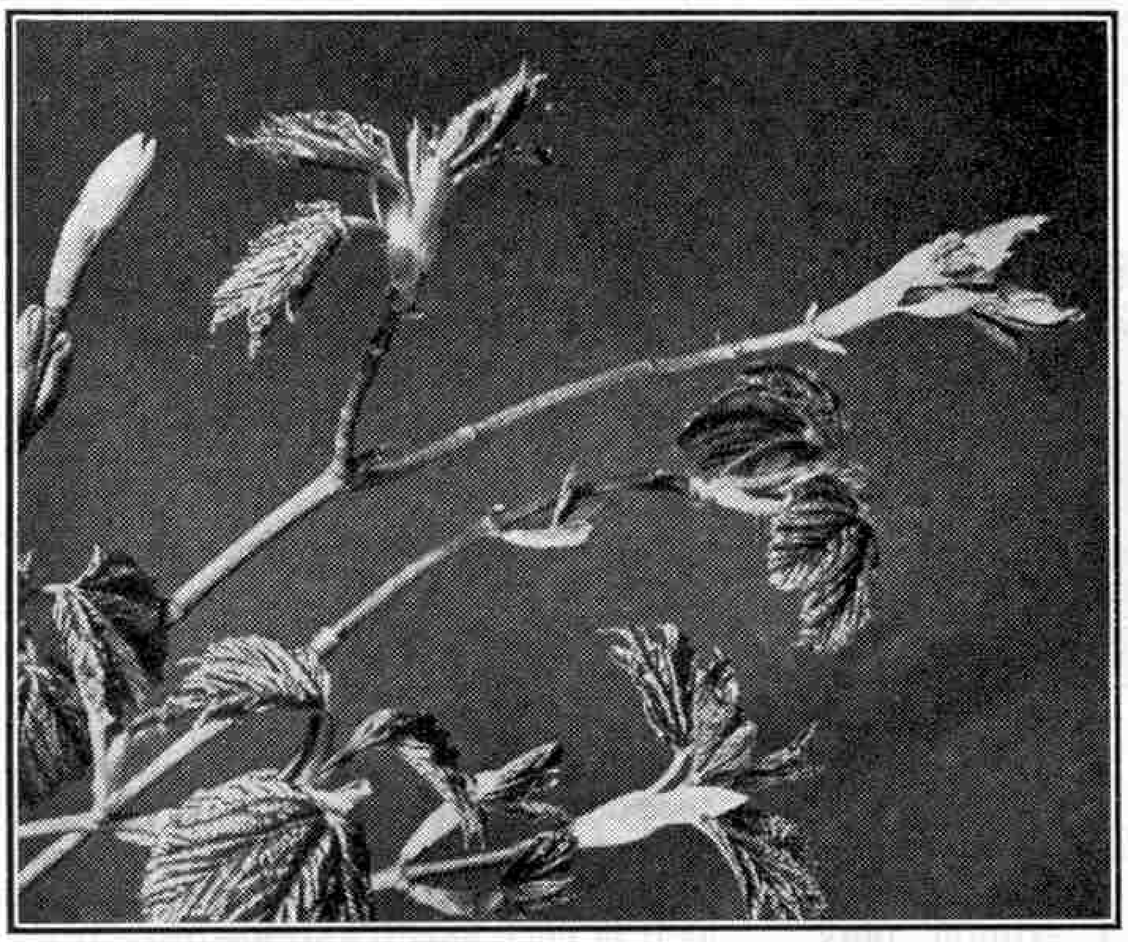
and I hope to go on adding to my collection year by year.

A friend of mine has made a most interesting collection of photographs of trees, and the large album containing them is a source of admiring wonder to all who see it. When he first got the idea he set out to find a good specimen of each common tree—oak, beech, elm, sycamore, etc.—standing in a position where it could be photographed against an open background so that its characteristic outline would be clearly seen. He then proceeded to photograph each tree once every month to show how it changed with the seasons of the year. In addition to the trees as a whole, he made pictures of the bark, leaves, flowers and fruit. He still continues his operations, dealing now with less common trees.

Trees, of course, do not interest everyone; but the same idea can be carried out with a great variety of other subjects. For instance, a series of pictures of a pet dog or cat, taken at regular intervals from puppy or kitten days, is of quite surprising interest.



"Down in Devon" is another example of F. H. Culverhouse's work.



"Bursting Buds." A nature study by Miss A. Roe, Sheffield.

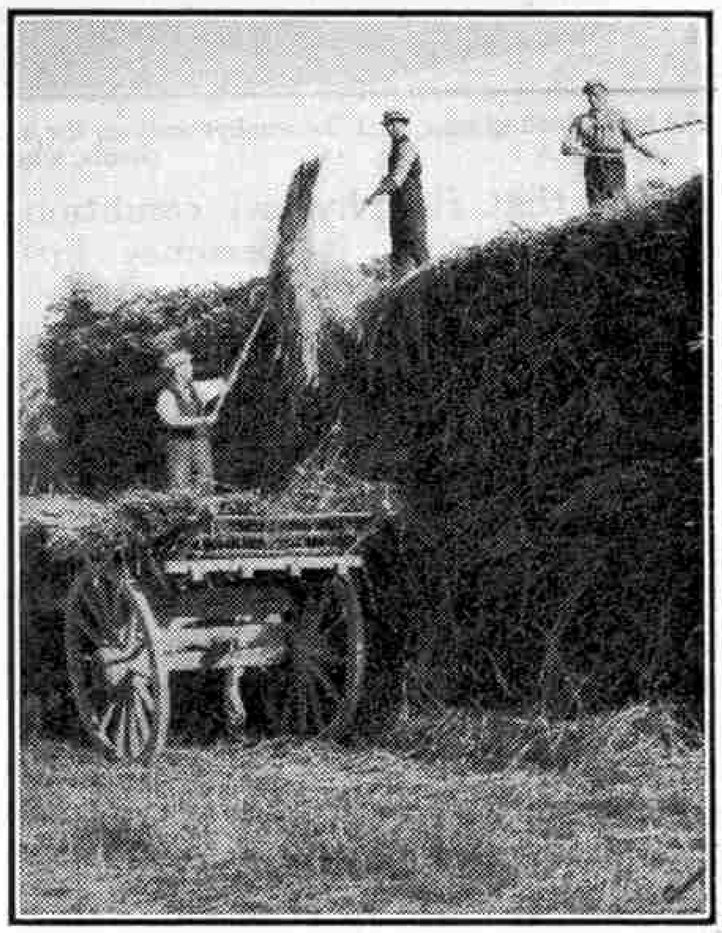
Many readers have been evacuated with their schools to country districts that provide all sorts of fresh possibilities. Here again, in addition to the casual snapshots of friends in their new surroundings, there are splendid opportunities for making a series of pictures of some type of subject. Quaint cottages, for instance, are good subjects; and a complete series of pictures of a small village, showing all its interesting features and including villagers going about their daily duties, would be well worth while. One important thing to be remembered is to make a note, at the time of taking each picture, of exactly what it represents. The date, of course, should always be noted. Sometimes this becomes of great importance after a few years, by which time great changes may have taken place; a building, for example, may have disappeared altogether.

The essential thing is to choose an interesting subject, and then to take every opportunity that comes along of making different pictures of it.

Before concluding let me give one important bit of advice. When you have made your prints, put the best one of each picture into an album at once. If you carry your prints round in your pocket, showing them to one admiring friend after another, you will find before long that you have given away all the best ones and that those you have left are crumpled and dirty. So harden your heart and fill your album before you give away a single print, even to your best chum!

Prizes for Pictures

With the object of encouraging readers to try their hands at this fascinating kind of photography I offer five prizes of £2 2s., £1 10s., £1 1s., 15/– and 10/6 respectively for the five best series of pictures of any one subject. Each series must consist of not less than three different pictures. The prints should be sent to reach me on or before August 31st, and each series must be accompanied by a short note explaining what the series, and also each print, represents. Envelopes should be addressed "Series Photographs Contest," Meccano Ltd., Binns Road, Liverpool 13.



Pictures such as this harvesting scene, by W. C. Cook, London E.18, could be included in a set of prints illustrating farm life.

Fish Farming in England

An Industry of National Importance in Wartime

By L. Hugh Newman

IN a quiet stretch of country in the heart of a southern county is one of the largest privately owned fish farms. It is situated in a district where the soil is heavy clay, and so the owner, Mr. L. Haig, had no expenses in connection with constructing concrete ponds to house his stock of fish. He simply dug small ponds in the fields surrounding the farm and stamped the clay until it became "puddled," which really means that its physical condition is changed and it becomes impervious to water.

Apart from the bungalow where Mr. Haig lives there is only one other building of note on the premises, and that is the packing shed. This is a dimly lit room lined with row upon row of shelves, stacked with fish cans for dispatch, and small glass aquaria where many of the tropical varieties are kept. Close by there is a large rockery, not covered with plants, but with tiers of small round tubs sunk to the level of the rim in the earth. This is where the living fish food is reared, such as water fleas, water lice, and tiny shrimps, as well as numerous beetles, molluscs and aquatic larvæ.

Most of the plant life and water lilies are kept in a series of shallow concrete ponds, which are built on a slight slope so that there is a constant movement of water maintained. The main breeding quarters, where most of the stock of fish is raised, are the puddled clay ponds. As might be expected, the greatest demand is for goldfish and golden orfe. Actually the latter are becoming more popular, on account of their greater hardiness, and also because of their active habits, sociability, and soft salmon pink colour in comparison with that of the common gaudy goldfish. Also the golden orfe is less susceptible to the fungus disease that often attacks goldfish.

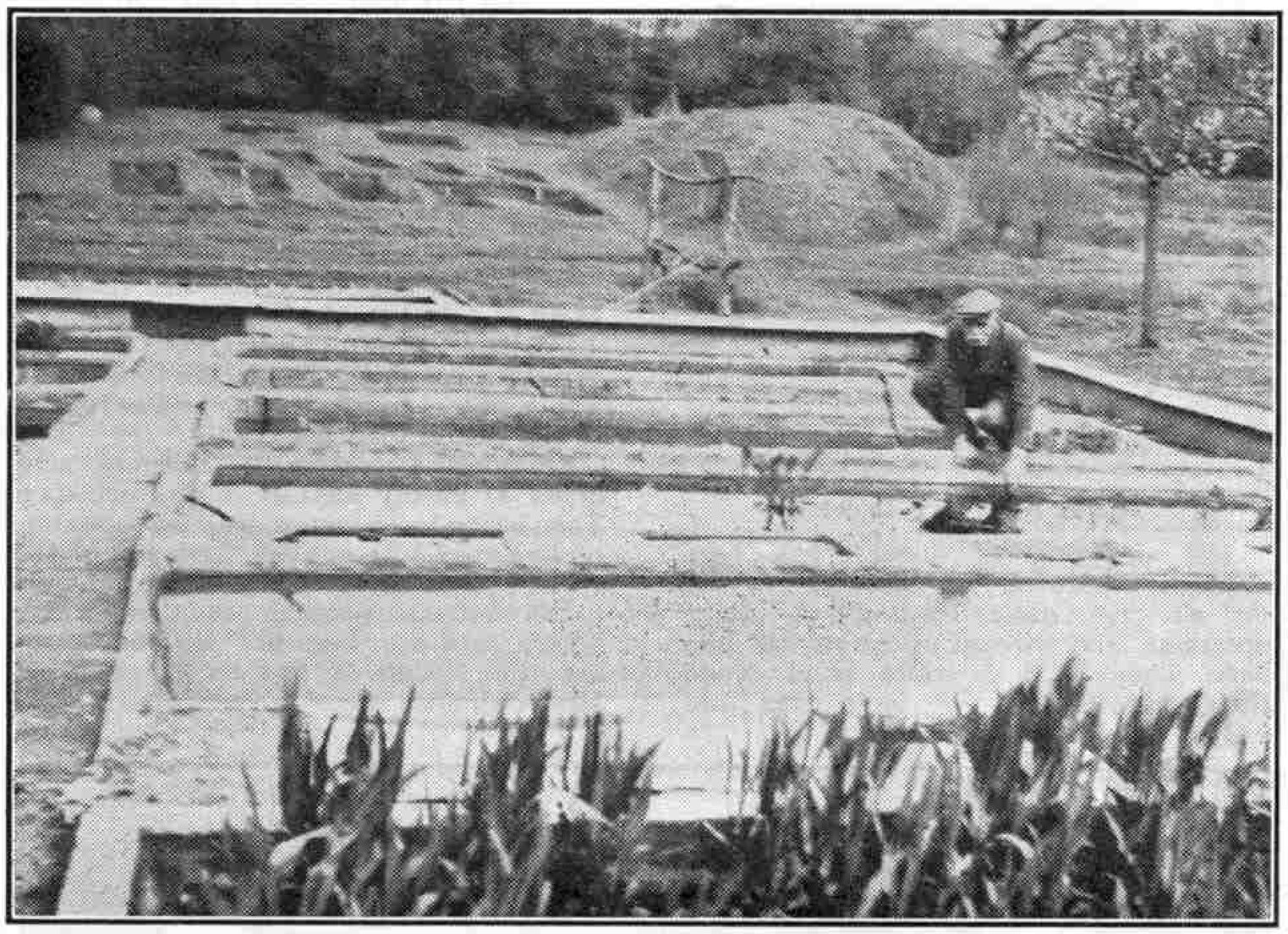
There are many other ornamental fish, both English and foreign, reared like this out of doors. One of the latest introductions is the primrose fish, which is really a pale variety of the common goldfish. Its colour is a rich metallic yellow-gold and it stands up perfectly to the English winter. In other ponds there are goldfish of mixed colours and pure silver, also golden tench, golden rudd, king carp and sun-fishes. The sun-fish are particularly attractive because of their lovely colouring, and they become very tame. In the summer they build a curious nest and stand guard over it until the young have hatched.

Besides all these purely ornamental fish, quantities of ordinary British fresh-water fish are bred on the farm. These are intended mainly for stocking large ponds or lakes with edible fish. At the present time, when deep sea fishing is a dangerous occupation, owing to U-boats and mines, the work of increasing our stock of fresh water fish is of national importance. There is a close season between 15th March and 15th June each year, when most of our British fresh-water fish may not be sold or purchased. This is their breeding season, and it is important that they shall not be disturbed then.

Perhaps the most beautiful of the British fish is the perch. It has scarlet fins and golden-brown sides with dark stripes running across its back. Large perch are dangerous to have in a pond of mixed fish, as they are likely to devour all the smaller fry. The same may be said of pike, which are notorious gangsters who chase smaller fish and swallow them, with one exception, the stickleback, whose sharp spines makes him immune from all attacks. In contrast to this gudgeon is a great asset to ponds and lakes as it is an excellent scavenger. The tench is one of the very best species for localising as it is very hardy and healthy. It is sometimes known as the "doctor fish," as the natural sliminess of its skin is supposed to have the power of curing the diseases of other fish it comes in contact with. The most odd-looking British fish is the bullhead, or miller's thumb as it is sometimes called. It has an enormous head crowned by a number of curious "warts," a wide mouth and bulging eyes, and a very small tail. In spite of its hideous appearance it is a good fish for making nourishing soup.

As there is no close season for

The large floating cage, and the smaller ones on the bank, are for storing fish just prior to their being despatched to clients, where this is possible.



This group of concrete ponds is used for raising plants for aquariums and ponds, and for raising water insect larvæ for School Nature Study and for feeding fish.

foreign fish, many estate owners apply for these during the spring and early summer when British fish are unobtainable. The bitterling, which is the smallest of all the species of European carp, is sometimes called the rainbow fish on account of its lovely tints. Its breeding habits are extremely interesting, the eggs being laid between the shells of a particular species of fresh-water mussel. The ide is commonly known as the "silberorfe" on the Continent, and is very good for eating. The writer remembers seeing a huge shoal of these fish round a water-side restaurant in Southern Finland, where they were kept as pets and fed regularly by the visitors. Some of them were as much as 2 ft. long and looked even larger through the clear water. The fact that these fish thrive in such a Northerly climate shows that they are perfectly hardy in this country. On the fish farm all the foreign varieties are bred out of doors and thoroughly acclimatised before distributing.

Undoubtedly the trout is the most useful fish for localising with the aim of increasing our food supplies in wartime. Trout spawn from about the middle of October to the middle of December. The period of incubation varies from six to twelve weeks according to local conditions and the temperature of the water. In waters where breeding trout do not occur, they may be introduced by "planting out" fertile eggs. Special hatchery gear must be used to confine the young fish so that they can be properly fed and protected from natural enemies.

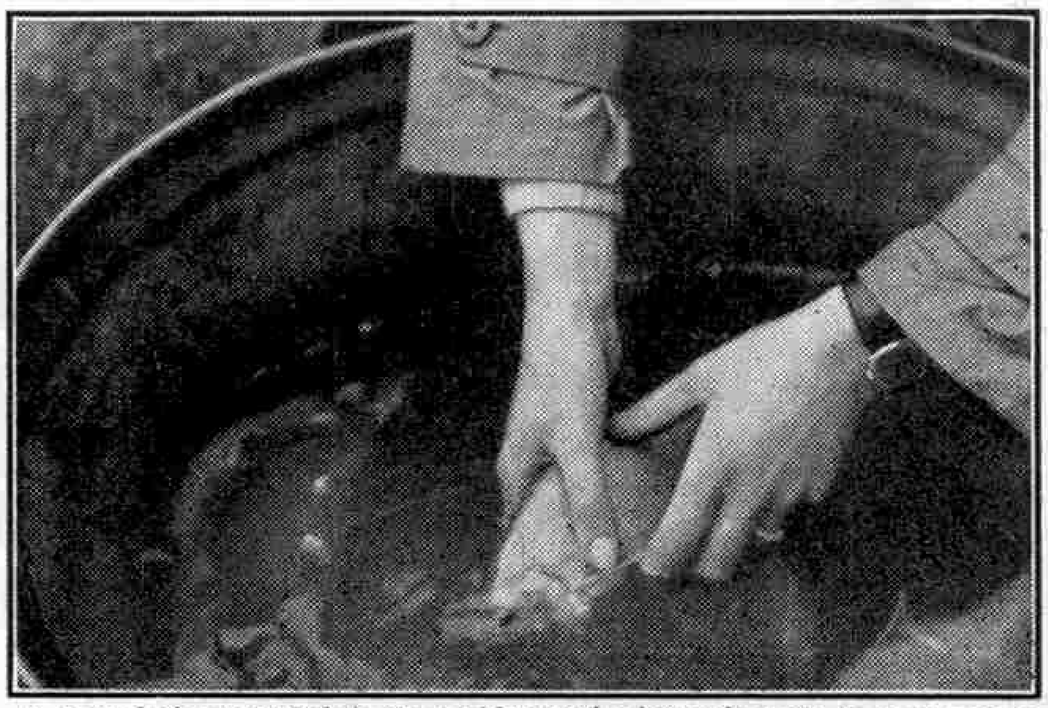
A pond will never be successful unless a provision is made for what is scientifically known as the balance of life. This means that certain plants that manufacture oxygen must be introduced, with small snails to act as scavengers, and various minute insects that breed in the pond and serve as natural food for the fishes. If a proper balance is established the water need never be changed, as it keeps pure and clear, and if the pond is large enough the fish do not need artificial feeding.

At the fish farm all the fish that are needed for dispatch are scooped out of the ponds with nets fixed to the ends of long poles. Any surplus ones that are caught are put into little wooden boxes with holes bored through their sides. These boxes are then stood in the water, and the fish will live for a long time, and be easier to catch when they are wanted. Most fish are sent away in the metal cans already mentioned, but some kinds, which will live for a long time without water, are merely wrapped in damp water weeds if they only have to travel a short distance.

A great many of Mr. Haig's customers are school teachers who need specimens for biology classes, and this has led to the development of quite a separate branch of the business. A small hillock has been enclosed with a concrete wall 2 ft. high, and here a number of tortoises are reared every year. A long narrow pond is railed off with fine mesh wire netting, and here common frogs, edible French frogs, fire-bellied toads, clawed toads and bell toads are bred. This last is a particularly interesting species. In the evenings the males call to each other with a note as sweet and musical as that of a tiny bell. The males also carry the eggs on their backs until the tadpoles emerge. If this pond is approached warily it is possible to see all the toads and frogs sitting along the edge, but as soon as they hear the slightest sound they will leap into the water like a massed diving display at a swimming gala.

Lizards, salamanders and newts are kept in glass aquaria in the packing shed. The most curious creature of all is the Mexican Axolotl. It has a large flat head with an enormous mouth and tiny eyes, and on each side of the head three feathery branchiæ, or gills, which are its breathing apparatus. The rest of the body is rather like that of a newt.

There are many other interesting aquatic creatures on this farm, such as water spiders, whirligig beetles, and strongly scented musk beetles; but in the scope of this short article it is impossible to describe them all. Nearly all of them can be kept in small indoor aquaria or vivaria, and as they cost very little to feed, they are worth while considering as a new wartime hobby.



A batatul of Golden Orfe in the packing shed prior to despatch to an aquarium.

AIR NEWS

Lockheed "Lodestars" for South Africa

The upper photograph on this page shows the "Lodestar," the latest Lockheed commercial transport. South African Airways have ordered a fleet of 16 of these American machines. The "Lodestar" is a middle wing monoplane developed from the Lockheed 14 transport, and when fitted with two Pratt and Whitney "Cyclone" engines it has a top speed of 249 m.p.h. and a cruising speed of 233 m.p.h. It has a range of 1,200 miles. The normal crew total three, and there is seating for 14 passengers.

Latest Giant American Aircraft

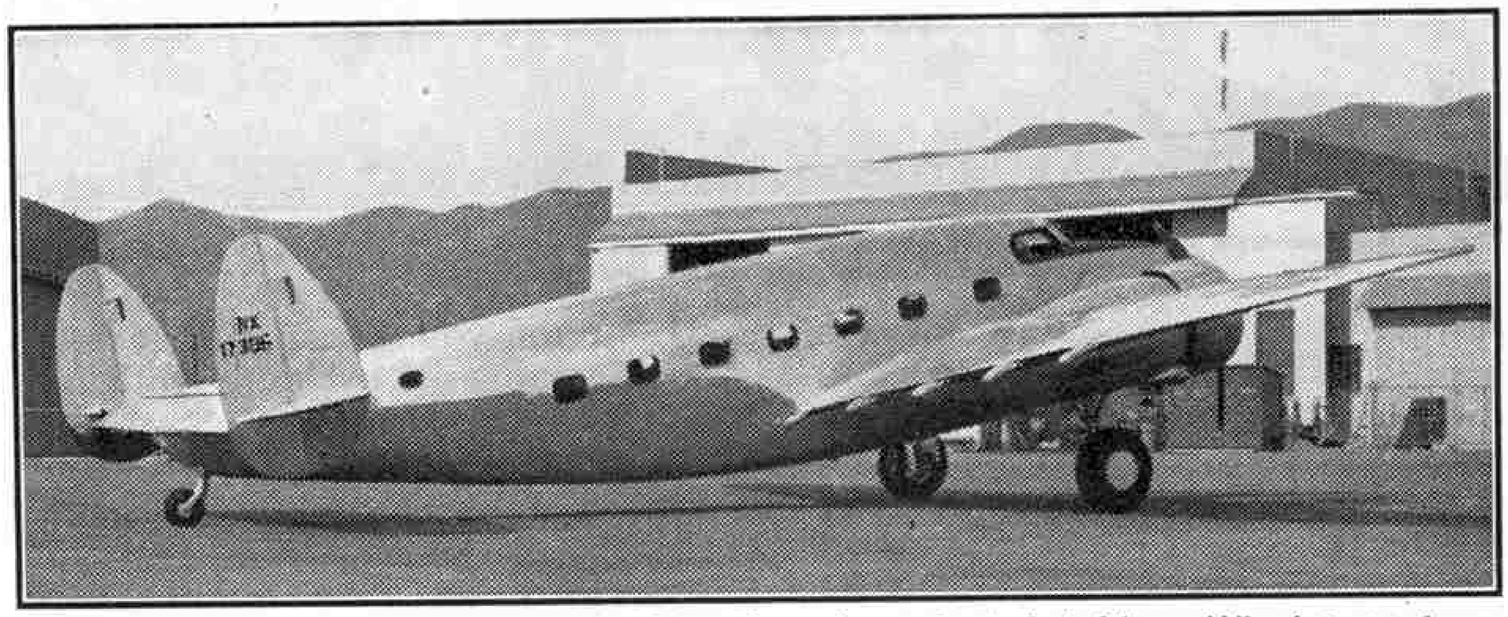
Brief details have been announced in the United States of two new huge four-engined aircraft. The first is the Douglas B19 bomber under construction for the United States Army Air Corps. This truly formidable machine has a wing span of 210 ft. Its four engines will develop a total of about 6,000 h.p. and drive 16 ft. diam. 3-bladed air-screws, and it is calculated that they will give it a top speed of about 200 m.p.h. The gross weight of the B19 is expected to be 70 tons.

An even bigger aircraft is being built for the United States Navy by the Glenn L. Martin Company, of Baltimore. This is a flying boat that will have a wing span of 230 ft., engines developing a total of 9,000 h.p., and a cruising speed of 200 m.p.h. It will carry a crew of 15. The gross weight of this air giant will be 84 tons.

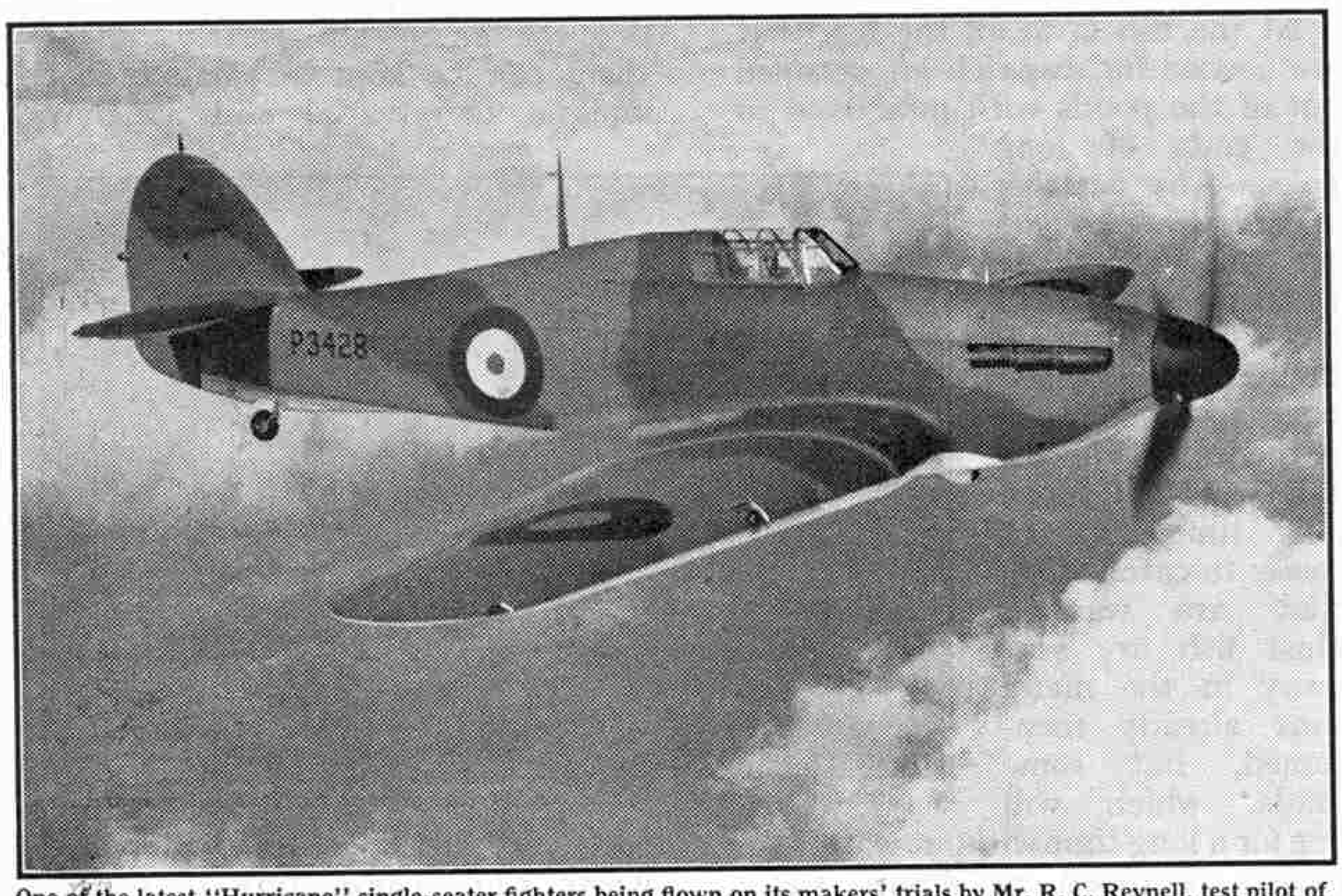
Royal Air Force Cadets

The designation "Cadet" has been officially approved for airmen training for air crew duties—that is as pilots, observers, and wireless operators/air gunners. They wear a white band round their caps. Cadets who have been provisionally selected for commissioned rank wear in addition a white armlet, and are known as "Air Cadets."

Pupils for training as pilots and observers now go straight to Initial Training Wings as soon as vacancies occur. Those cadets for wireless operator/air gunner duties go first to one of the technical training schools.



A Lockheed "Lodestar" 14-seater air liner. South African Airways have ordered a fleet of these middle wing monoplanes. Photograph by courtesy of Lockheed Aircraft Corporation, U.S.A.



One of the latest "Hurricane" single-seater fighters being flown on its makers' trials by Mr. R. C. Reynell, test pilot of Hawker Aircraft Ltd. This photograph and the upper one on the opposite page are by courtesy of "The Aeroplane."

The "Defiant" goes into Action

The new British fighter, the Boulton Paul "Defiant," is the first fighter to have a power-controlled gun turret, which is just behind the pilot's enclosed cockpit. Details of performance are secret.

The "Defiant" has already given German airmen good reason to avoid it. The first air battle of one of these new two-seater fighters took place recently when the pilot of an R.A.F. "Defiant" sighted a Junkers Ju 88 bomber out at sea trying to bomb three British ships. The battle lasted only five minutes, and ended in the destruction of the enemy machine.

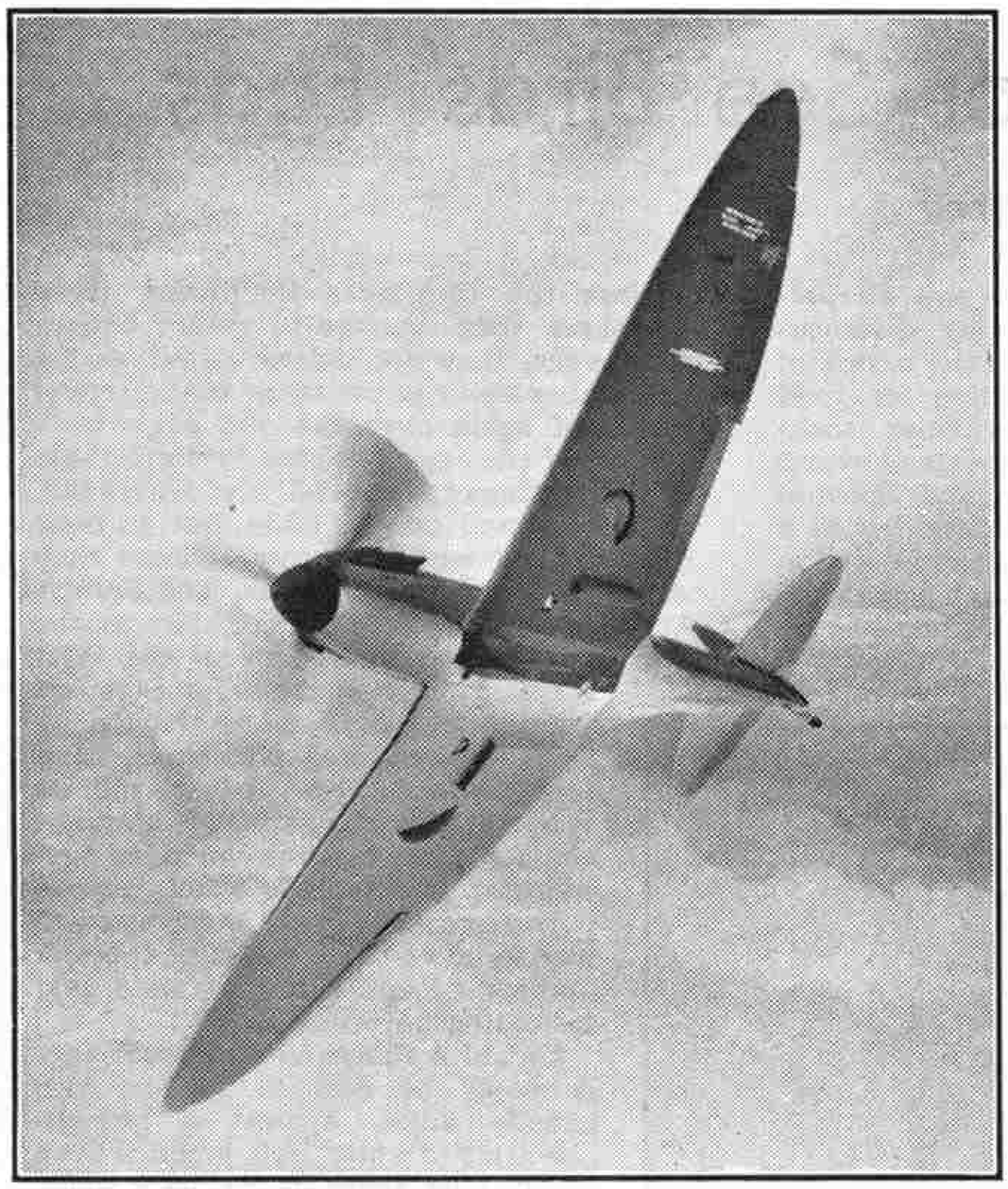
On another occasion 12 "Defiants" shot down 37 enemy aircraft during one day. They began by encountering a big formation of Messerschmitt fighters, and one of the R.A.F. pilots afterwards described the air battle that took place as "the liveliest dog fight I have ever been in." He went on to say that "while it was on we and the Messerschmitts were mixed up with between 30 and 40 Ju 87s that were dive-bombing a French port. When the scrap ended we were alone, in complete possession of the air. We found we were intact, but in this little bit of trouble the Germans had lost nine Messerschmitt 110s and one Ju 87."

Later this squadron again came upon a large formation of Junkers Ju 87s dive-bombing off a French port. The Germans had set three small vessels on fire, but paid a big price for these ships. The method adopted by the Junkers pilots was to dive vertically to 500 ft. and then flatten out. The British pilots also dived, waited until the Germans had "pulled out," and then let them have a devastating hail of machine-gun fire. At least 21 of the enemy aircraft were sent down, broken up or in flames.

The average age of the pilots of this squadron is 25. They are highly trained young men of long experience, and it was their complete confidence in themselves, their air gunners, and their aircraft that made their success possible.

Lockheed Monoplane as Flying Laboratory

A Lockheed monoplane similar to the 14 type has been bought by the Sperry Gyroscope company of the United States. It has been designed specially for flight research, and has special observation domes for testing gyroscopic navigation equipment. Provision has been made also for research to be done in the aeroplane on new direction-finding and instrument landing equipment, and there is a compartment equipped with work benches, etc., for the use of the engineers.



A "Spitfire" single-seater fighter being test flown before delivery to the R.A.F.

Kent, Not Köln

While flying on patrol duty in France at a height of well over 20,000 ft., a young R.A.F. fighter pilot suddenly felt queer. He noticed that something had gone wrong with his oxygen supply, and by radio informed his section leader. Back came instructions "Get down to 2,000 ft."

What happened afterwards is best told in the pilot's own words: "When the order came through, I was feeling on the verge of collapse, so I pushed the nose down. Certain periods, perhaps they were just moments, are a complete blank. I had certainly dropped a good bit when my faculties appeared to be functioning more normally, but I was still feeling very much out of sorts, and not a bit like flying on. Suddenly I spotted a coastline, and flew down to a low height, wondering whether I should be greeted by 'Archie' (anti-aircraft fire) and perhaps forced down in a land full of swastikas. Nothing of the sort happened. All seemed friendly and peaceful. Then it occurred to me that I was flying over a part of the French coast, so I decided to land, get my bearings, and fly back to the station.

"Soon after landing, I spotted some workmen, and shouted: 'Where am I?'"

"'You're in Kent. Where do you think you are?' one of them retorted.

"Well, it was nice to be in England, if only for a short while, but it shows you what a shortage of oxygen can do."

More Boeing "Stratoliners"

The delivery of three Boeing "Stratoliners" to Pan American Airways has been followed by the delivery of the first of a similar fleet to Transcontinental and Western Airlines, Inc., another of the big United States air transport firms. The "Stratoliner" is a twin-engined 33-seater air liner, with passenger cabins equipped with an altitude conditioning system for comfortable flight at "above the weather" heights.

Why Air Raid Sirens are not Always Sounded

When you read accounts of German aircraft activity near our coasts, and see the words: "No air raid warnings were sounded," do not think that these words are a criticism, and mean that air raid warnings should have been sounded.

"Spitfires" and "Hurricanes" of the R.A.F. Fighter Command have brought down many of the raiders who have taken part in this raid activity, and others have been shot down by shore or ship A.A. guns. If sirens had been sounded every time one of these enemy aircraft approached, many valuable hours of war-time industry would have been lost, children and old people would have been alarmed unnecessarily, and the rest of us would by now have become so used to the sound of the sirens that we should have ceased to pay attention to them.

The decision to give or not to give an air raid warning rests with the Air Officer Commanding-in-Chief, Fighter Command. When serious German raids on land objectives in this country take place you will hear the air raid sirens.

Another New Empire Flying Boat

British Overseas Airways Corporation have put into service another new Empire flying boat. This is named *"Cleopatra,"* and is the second of what are called the S33 type. The first is named *"Clifton."* The *"Cleopatra"* is commanded by Capt. C. E. Madge.

No Sooner Said than Done

A formation of six R.A.F. Fighter Command "Hurricanes" was on patrol over the sea, off the south coast of England Suddenly the leader spotted a German Henschel aircraft 2,000 to 3,000 ft. below. He spoke into his radio telephone to one of his accompanying pilots: "Hello. There is a Hun below you. Go and deal with it."

The "Hurricane" pilot to whom the radio message was given left the formation and dived down, without a word. He went straight at the Nazi aircraft below, pressed his gun button to send a few hundred rounds of ammunition into it, and saw it go down in flames to the sea. He then climbed back to rejoin his flight.

Again the Squadron Leader's radio-telephone spoke: "Hello. Hello. Did you get my message? Repeat, did you get my message? Over to you."

Back came the laconic reply from the successful pilot: "Your message received. Your message received . . . and understood. Over to you."

Veteran Royal Air Force Pilot on 1918 and Now

Hundreds of pilots who fought the Germans in the air in the war of 1914–18 are back in the Royal Air Force again. Most of these veterans are now carrying out some of the many ground-staff jobs that exist in the modern R.A.F., but one old-timer who has come back to the R.A.F. after 25 years is actually flying again. In the Great War he was on reconnaissance duties over the German lines in French territory, and to-day, as a member of a Communication Squadron, he is flying over the same country, sometimes carrying mails and important dispatches and more often "ferrying" important personages to various parts of the French war zone.

This veteran pilot regards modern aircraft as both safe and luxurious in comparison with the "kites" he flew in 1918. "We had no parachutes last time; if you came unstuck you were finished," he said recently. "Now, of course, you have a life-belt upon which you can rely."

Boeing B-17B "Flying Fortress" bombers in the final stages of assembly. Photograph by courtesy of the Boeing Aircraft Company, U.S.A.

Descending the Cliffs for Sea Birds' Eggs

By G. Bernard Wood

TWO small groups of men in the tiny village of Bempton, on the Yorkshire coast, share one of the most adventurous jobs that Britain can offer. Every year in the early summer they descend the precipitous chalk cliffs in the neighbourhood and gather eggs laid by sea-fowl on the narrow rock-ledges. These cliffs, towering 400 ft. and more above the sea, are quite unscaleable, which probably explains why so many thousands of gulls breed here annually. The climbers, "climmers" as they are called locally, lower one of their number by rope from the cliff-top.

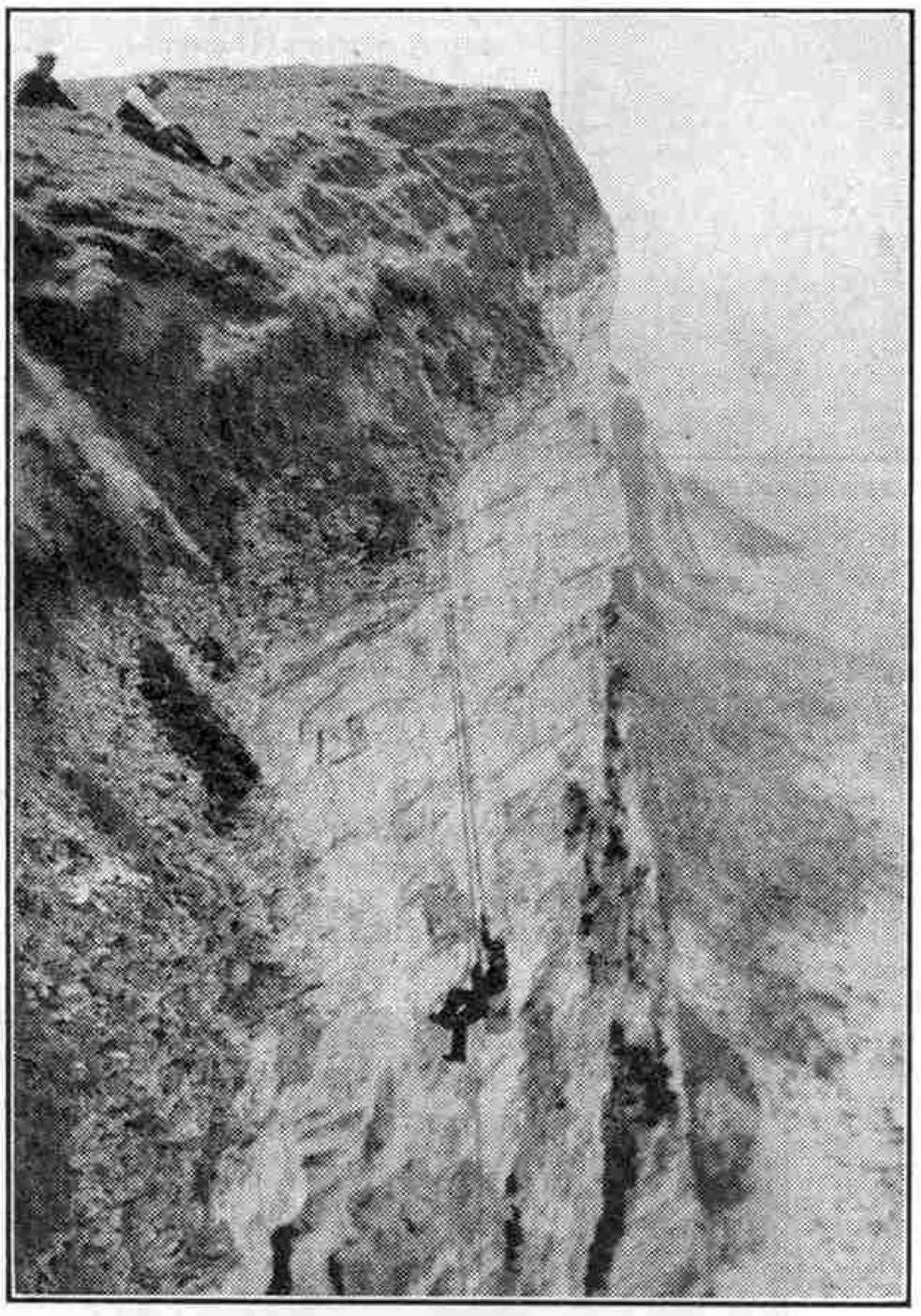
When fully equipped for the part he has to play, the actual egg-gatherer presents a strange appearance. On top of an old suit he wears a kind of sling-chair made of strong webbing, strapped from the shoulders and around the waist and thighs. The haulage rope is affixed to a metal ring at waist level. On both sides he carries a deep canvas bag for the reception of the eggs, and as protection against falling rock he wears either a tin hat or an old police helmet.

The remaining men, three or four in number, act as lowerers. They sit at short intervals from each other in specially prepared hollows, engage their feet firmly in the ground, and then proceed to pay out the rope as their mate descends. To prevent chafing, the rope runs over two spike-pulleys, placed—one of them by the egg-gatherer himself just before he disappears from view—at the cliff edge; and an independent guide rope, with which he steadies himself, is secured by a stake on one side of the lowerers.

The chief lowerer wears a thick, wide leather belt provided with a deep groove. As the gatherer descends the lowerer lets the rope slip through this groove, his burly form thus acting as a brake. Meanwhile the other lowerers hold the free end of the rope lightly in readiness for the ascent, when they all pull directly and in unison, their bodies moving to and fro in perfect rythm.

Now let us watch the egg-gatherer at work. From a projecting shoulder of the cliff one can see, as he fearlessly steps off *terra firma*, how his legs come into play during the descent. Calmly and confidently he places his foot against the jagged rock. On arriving at some egg-laden nest or ledge he signals on the rope, and the ensuing pause allows him to make his selection, for only a few of the eggs are actually taken. Sometimes he will descend to within a few yards of the sea; sometimes —with a clever side-swing—he will land on a wide ledge for a momentary rest, or in order to scrutinise adjacent ledges. Sometimes he may be struck by a falling piece of rock.

Gradually the canvas bags are filled, and the long, stiff ascent begins, in response to the appropriate signal. Then at last the cliff edge is reached again, the egg-gatherer brings with him the farthermost spike-pulley in readiness for another descent at the next pitch. The pitches are all pre-arranged. Situated at varying distances from each other, according to the nature of the ground and the reputation for good clutches of eggs that particular rock-ledges may have earned, they extend over a few miles of the Bempton and Speeton Cliffs, and provide the "climmers" with a "round" that is normally covered within three days. At the end of that period the same ground is covered again; many more eggs will have been laid in the meantime.



Egg-gatherer at work on Bempton Cliffs.

After each descent keen interest is always shown in the egg-gatherer's haul. As he carefully places the eggs one by one in a basket, his companions, an egg-collector or two, and maybe a few spectators, crowd around in the hope of finding something specially beautiful or even unique.

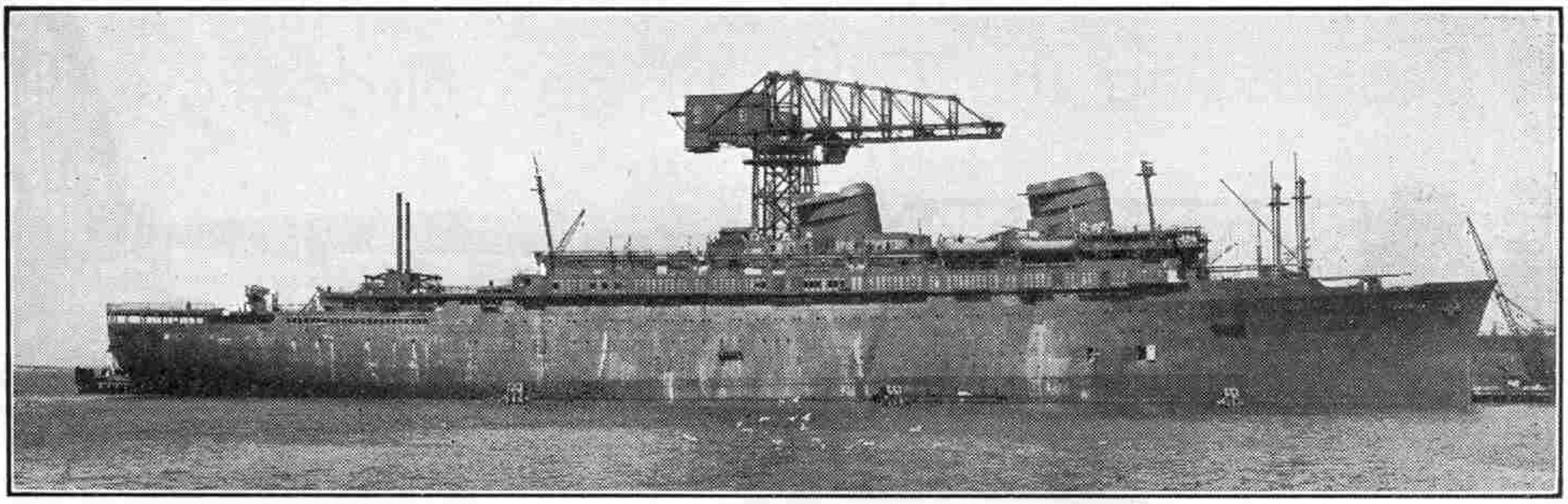
Occasionally a collector, that is one who collects eggs for a hobby, may have espied a particularly fine egg down below with the aid of a telescope. This necessitates a special descent. Sometimes one of the spectators, thrilled with what he has already seen, asks if he may don the gatherer's equipment and be lowered down the cliff. Such requests are usually granted, but many—at their first glimpse of the sea from this alarming angle—pull frantically on the rope until they are hauled to the cliff-top again! Other amateurs get on fairly well, experiencing nothing worse than a spin in mid-air or an occasional bump against the rock-face. If, during these gyrations, they manage to gather two or three eggs, they are indeed elated, and a heartening shout greets them as they crawl landward again over the cliff edge.

Most of the eggs gathered here are those of the Guillemot, Razorbill and Kittiwake. Puffins abound on the cliffs, but as their eggs are laid within narrow crevices they are usually difficult to obtain. The Fulmar Petrel, too, now breeds here, but as the bird is scheduled under one of the Wild Birds Protection Acts its eggs are left untouched. Eggs of the Guillemot, Razorbill and Kittiwake, however, provide an almost infinite variety of markings and colourings, and for some rare specimen an egg-collector will pay as much as one pound or even more. A few pence will buy some of the commoner types, a number of which are actually sold for eating purposes.

Out of a thousand Guillemot eggs it would be difficult to find two exactly alike. Against a ground-colouring of white, buff, green or even bright blue, there are jet-black spots, blotches and streaks that often form very beautiful designs. Among the eggs of the Razorbill, the "reds" are rarest and in greatest demand. The Kittiwake's egg is smaller, and often prettier, than that of either the Guillemot or the Razorbill, but its thin shell makes it delicate to handle. The simple beauty of the Puffin's eggs is not at first apparent. As they come from the gatherer's bag they are frequently coated with dirt from the crevices or holes in which they are found. When this is removed there is revealed a white egg, about the size of a hen's, dotted occasionally with a few pinkish-brown spots at the broad end.

What of the birds themselves? Do they resent their eggs being lifted? The Guillemots generally do not seem to mind; obligingly they lay a second egg and even a third in the same season. The Kittiwakes get alarmed and circle in a frenzy around the interloper. But the Razorbills attack! This bird, the nearest living relative of the extinct Great Auk, has a short flattened beak as sharp as a razor; it would often be used effectively on the gatherer's face or hands if he were not ready to counter its assaults with a vigorous sweep of the arm. The Puffin also can be rather vicious, despite its comic appearance.

It will be seen that the life of an egg-gatherer is very adventurous. As he and his companions pack away their tackle in some secret dug-out on the cliff-top at the close of each day's work, speculation about the next day's venture must often arise. Will overnight rain make the cliff-face treacherous with loose rock, or will a gale rise suddenly from the sea to roar with cold fury around the "climmer?" On the other hand, a Razorbill "red" may be among to-morrow's haul, or the equally rare Guillemot egg in plain dark blue!



T.S. "America," the largest passenger liner yet built in the United States.

America's Largest Passenger Liner

A Great Shipbuilding Programme

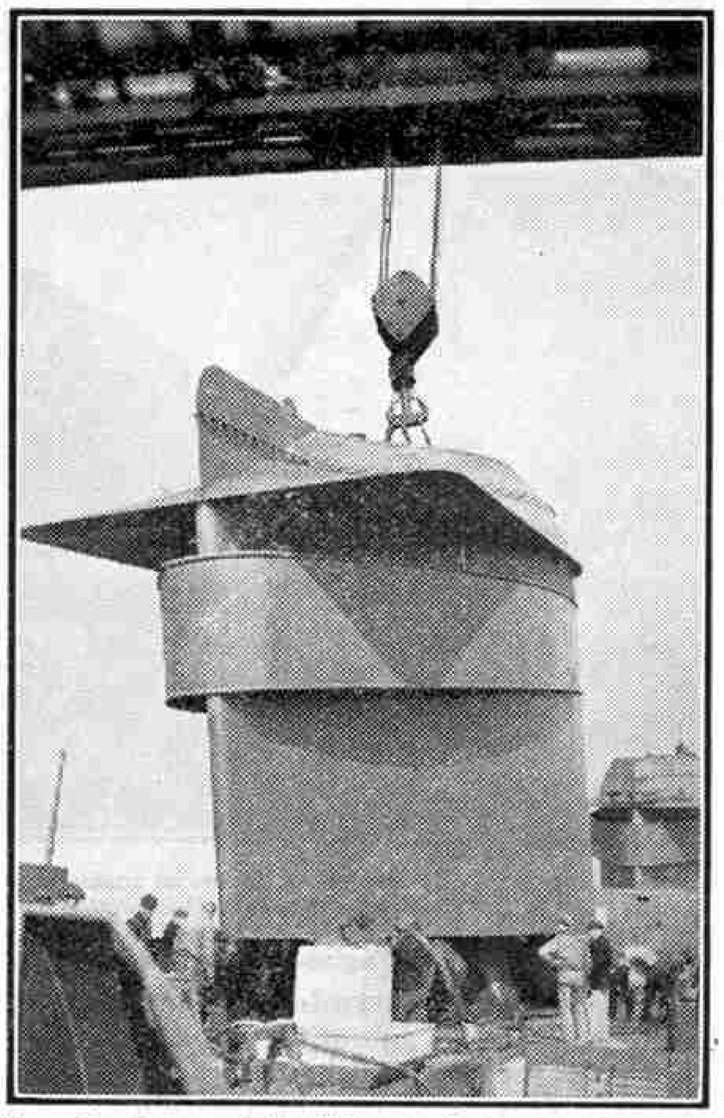
ONE of the most outstanding passenger liners now under construction is the 30,000-ton "*America*," which is being built in the United States by the Newport News Shipbuilding and Dry Dock Company. This ship, which is the largest mercantile vessel yet constructed in America, was launched at the end of August last year. She is intended for the North Atlantic service of the United States Lines, in which she will operate in conjunction with the existing liners "*Manhattan*" and "*Washington*," and work is now being hurried forward to complete her in time for the scheduled date of her maiden voyage this summer.

The "*America*" has a length of 723 ft., and a beam of 92 ft. Accommodation is provided for about 1,200 passengers and a crew of 639. The illustration at the head of this page shows the vessel in the fitting out basin at the shipyard a few minutes after the second funnel had been stepped.

The funnels are a distinctive feature of the ship. They are of squat streamlined design with special wings that are readily seen in our lower illustration, which shows the after funnel suspended from a crane and about to be set in place on the top deck. The purpose of the wings is to prevent smoke from settling on the sports deck below. The forward funnel is a dummy, and in it are housed the emergency generator and auxiliary equipment. The height of the funnels above the bottom of the keel is 130 ft.

The propelling machinery of this fine vessel consists of twin sets of geared turbines having a designed output of 17,000 s.h.p. These will drive the two propellers at about 128 r.p.m.

Work is now proceeding rapidly on the interior decorations of the liner. A novel feature in this connection is that the furnishings have been designed by Smyth, Urquhart and Marckwald, the only firm of women decorators that have yet been entrusted with such a task. The promenade deck is entirely enclosed by huge windows, which extend from floor to ceiling, thus affording an unobstructed view of the sea, even to a passenger reclining in a deck chair.

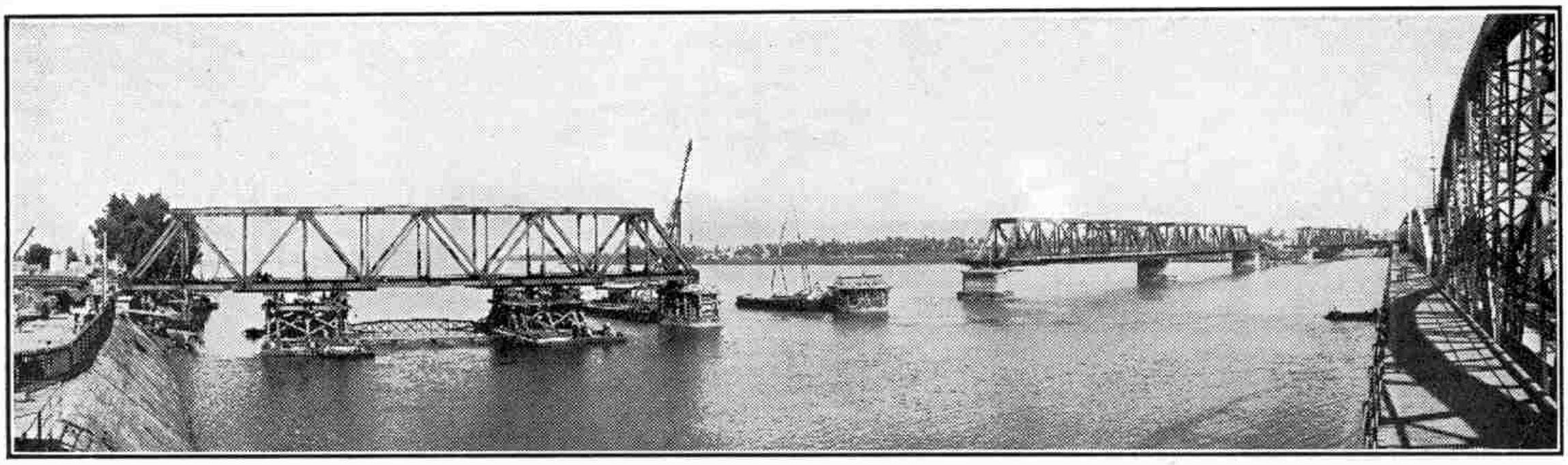


The after funnel of the "America" about to be set in place on the ship's top deck. This photograph and the one above are reproduced by courtesy of United States Lines Company, New York.

The "*America*" is the most important single unit that has so far been constructed under the United States Government programme of shipbuilding, which is planned to provide the United States with an adequate merchant marine. Under this ambitious scheme 500 merchant ships are to be constructed during the next 10 years. These will include both passenger and cargo ships.

The first vessels of the latter type were completed during 1939. They were ordered from leading United States shipyards and have been allotted by the Government for service with various American shipping companies. They are the first of 20 vessels to be known as Class C2 liners, and each has an overall length of 459 ft., a beam of 63 ft. and a gross tonnage of 6,194. They have a normal speed of approximately 15½ knots and are designed to standard specifications, the only variation being that 10 of them will be propelled by turbines and the others by oil engines.

The first two ships to be completed under this scheme were the "*Donald McKay*" and the "*Challenge*," which have already visited this country. The "*Donald McKay*" is driven by a four-cylinder Sun-Doxford oil engine having a designed output of 6,000 s.h.p., and the "*Challenge*" is a turbine-driven steamer.



The new bridge that carries the Egyptian State Railway across the River Nile at Nag Hammadi. Photograph by courtesy of the Egyptian State Railways.

ENGINEERING NEWS

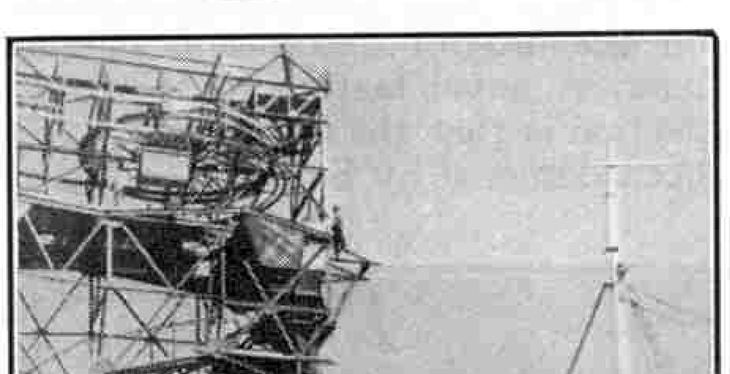
Loading Ships by Ropeway

The lower illustrations on this page and the opposite one are views of an interesting ropeway that has been erected on the south coast of Cyprus, for the purpose of loading ships with pyrites. Until the installation of the ropeway, ships were unable to lie close enough in shore to receive their cargoes, which had to be carried out to them in lighters.

The ropeway has a total length of 1,800 ft. and is able to load up to 200 tons of material an hour. The hauling rope is operated by an electric motor, and is driven at a speed of just under 274 ft. per minute. Loading of the buckets is effected from a large storage area excavated out of the high cliffs that form the shore line in the district. The material first passes into a crushing and screening plant, built in the cliff side, and the pyrites is then transported to the storage area by a belt conveyor, which is designed so that its load can be dumped at any selected point.

Over the top of the ropeway loading station is built the head gear of a scraper bucket excavator, which works to and fro over the storage area, and is arranged so that all parts of the area are brought within range of the bucket. The station is separated from the storage yard by a wall, which has a sloping ramp at its rear. The loaded scraper passes up the slope and at the top tips its contents into a bunker, from which chutes lead the material into the ropeway buckets.

The returning empty buckets of the ropeway are released from the driving rope at the entrance to the loading station, and are pushed into position under the loading chutes. When filled they are pushed through an automatic weight recorder to the outgoing cable, where they automatically grip the driving rope and are hauled away to the unloading station out at sea.



A ship being loaded by means of the aerial ropeway at Cyprus that is described on this page. This photograph and the lower one opposite are reproduced by courtesy of the British Ropeway Engineering Co. Ltd., London.

The unloading terminus consists of a concrete cylinder mounted on a concrete block set in the sea bed and filled with ballast. This is shown in the illustration on the opposite page. On top of this cylinder is the unloading and return gear of the ropeway and tension weights for the supporting cables. On reaching the turning point at the terminus the bucket locks are released and the pyrites is tipped down a chute into the ship's hold.

A New Nile Bridge

An old bridge that carried the main tracks of the Upper Egypt branch of the Egyptian State Railways over the River Nile, at Nag Hammadi, has now been replaced by the fine girder bridge shown in the illustration at the head of this page. The original bridge was built in 1897, and was not suitable for carrying the greatly increased loads of present day traffic and the heavier engines required to haul them. The new bridge carries a single line, suitable for the heaviest locomotives likely to be used, and two side roadways for motor vehicles of capacities up to 6 tons. Its total length is 1,410 ft., which is made up of six fixed spans, each 213 ft. long, and one swing span. Each of the fixed spans weighs 244 tons, excluding the roadways, which weigh 52 tons. The spans are supported on concrete piers, erected on caissons sunk into the river bed. The total weight of the steel used was 2,100 tons.

The new bridge is inclined at 9 deg. to the line of the old one, and consequently it was necessary to divert the main railway line and build a new passenger station. The old station has been retained for goods traffic.

A New Radio Aid to Life-Saving at Sea

All Danish seagoing merchant ships are compelled to carry a special form of life-saving raft. Unfortunately these rafts have the disadvantage that they are hard to sight from other ships, and sometimes shipwrecked sailors have drifted in the sea, for several days, some dying from cold or starvation. This led a Danish firm in Copenhagen to produce a new radio device, which they have named "Raft Radio." The apparatus consists of two 10 ft. steel-rod aerials, one of which is erected at each end of the raft, a 6-volt battery of dry cells mounted in a watertight case arranged to lie flush with the raft surface, and a one-valve midget Morse transmitter, which operates with an aerial output of 10 watts.

The whole set is entirely automatic and can be set to send out continuous signals merely by operating a single push lever. The batteries provide sufficient current to operate the transmitter for 10 hours at full strength, after which period transmissions continue with reduced signal strength for a further 5 to 10 hours. The transmitter is permanently tuned to the conventional distress-call frequency of 500 kilocycles, and tests have shown that it has a range of up to 40 miles over water.

High-Voltage Cable Inspection

X-rays are used for many purposes in industry and one of the latest applications is in connection with the manufacture of high-voltage electric cables. It is essential that the conductors of such cables shall be located centrally in the various insulation and armour wrappings, and it is to discover cables faulty in this respect that the X-ray apparatus is being used. The cable passes through the X-ray apparatus as it leaves the machine that applies the insulation. An operator sits watching two fluoroscopic screens, on which are projected two views of the cable interior taken from directions at right angles to each other. When a faulty section of cable is detected the operator presses a button that exposes two X-ray films, and simultaneously he marks the faulty portion of the cable so that it can be rejected if an examination of the X-ray photographs definitely shows that the conductors are too far from the centre.

A Pioneer Radio Station Memorial

A fine monument constructed in grey Cornish granite has recently been erected at Alum Bay in the Isle of Wight, to mark the site occupied by the first permanent wireless station in 1897. It was at Alum Bay that Gugliemo Marconi and other engineers carried out experiments that resulted directly in the successful transmission of signals across the Atlantic by wireless from Poldhu four years later.

Two New Motor Life-boats

The Royal National Life-boat Institution is laying down two new Watson cabin type motor life-boats for Douglas, Isle of Man, and Porthdinllaen, Caernarvonshire. Each boat will be 46 ft. long and will have two 40 h.p. watertight Diesel engines, giving a speed of 8¼ knots. They will carry sufficient oil to travel 200 miles at full speed without refuelling, and will be equipped with line-throwing guns, searchlights, and radio telephones. The boats will cost about £10,000 each, and are being built to replace less powerful motor life-boats of the same type.

The greater safety of the seas round Great Britain in recent months is shown by the decline in the number of life-boat launches. There were 48 launches in April, as compared with 86 in March, and yet the number of launches was a record for the month. The number of lives rescued in April was 22, and the Royal National Life-boat Institution made rewards to its crews of £994. In May the number of launches was 45, again a record for the month, and awards to crews amounted to £467, making a total of £15,375 for the nine months of war.

Large Tunelling Shields

Four large tunnelling shields have been built in America for use in the construction of a new subway that is being excavated in Chicago. Each shield weighs about 190 tons and is 25 ft. in diameter, with a length of 19 ft. Protruding from the front of the top of each shield is a powerful cutting edge, which will cut into the soil as the shield is forced forwards by 24 hydraulic jacks capable of exerting a total pressure of nearly 5,000 tons.

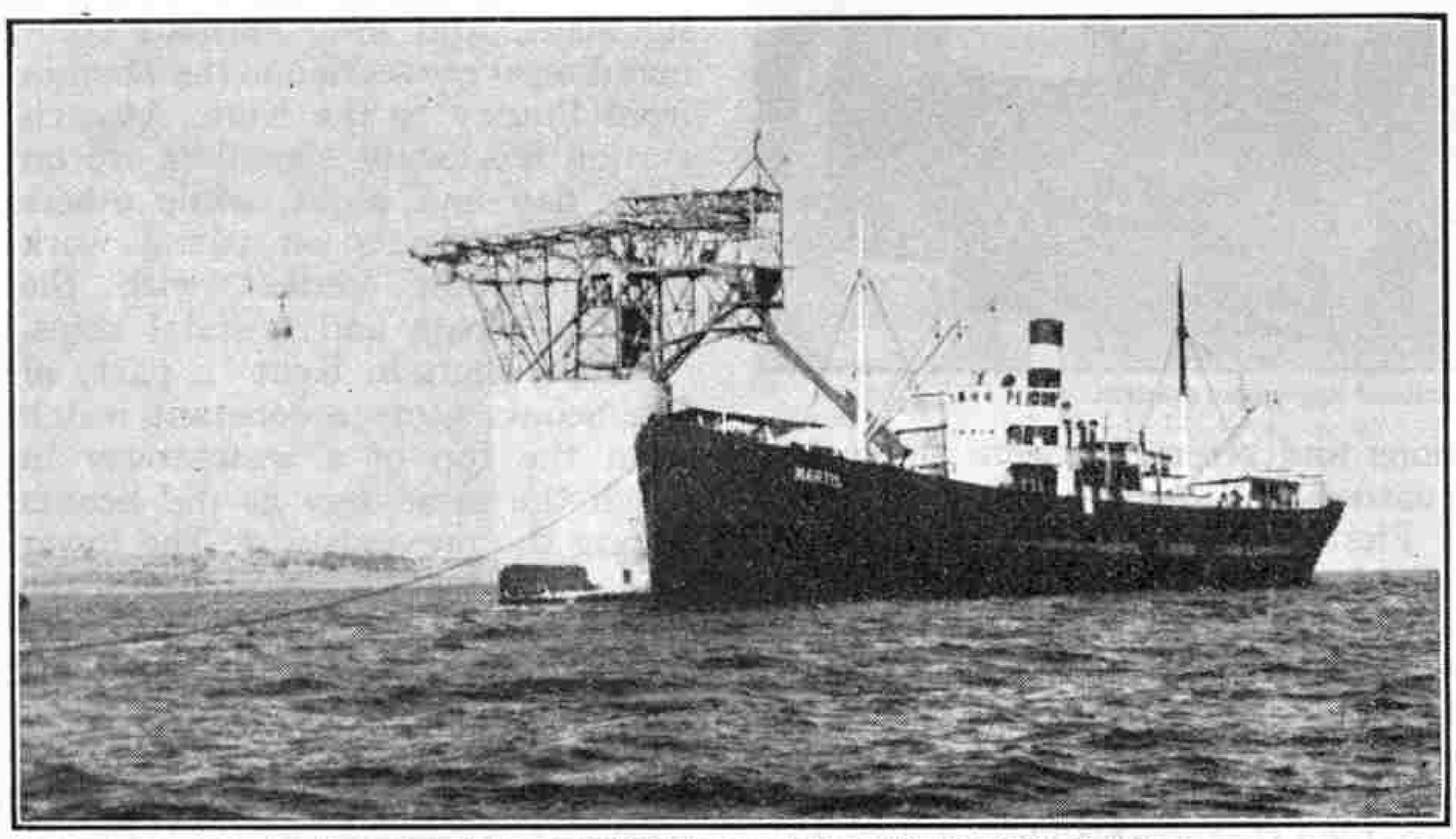
A Famous Ship Ends Her Career

Few ships have had a more varied career than H.M.S. *"Caledonia,"* the 56,599 ton British naval training ship, which has now been sold for breaking up. The vessel was originally the German liner *"Bismarck,"* and was laid down at Hamburg in 1913. After the Great War she was handed over to Great Britain as part of Germany's war reparations, and she then became the White Star liner *"Majestic."* She spent many years in the Southampton-New York service of the Company and was then sold for breaking up. It was later decided to convert her into a naval training ship, and she was commissioned in that capacity on April 23rd 1937 as H.M.S. *"Caledonia."*

Shortly before the present war broke out certain alterations were to have been made to the vessel, but she was badly damaged by a fire and the scheme was abandoned. She will end her eventful career in the breaking up yard of Thos. W. Ward Ltd.

A Novel Cable-Making Process

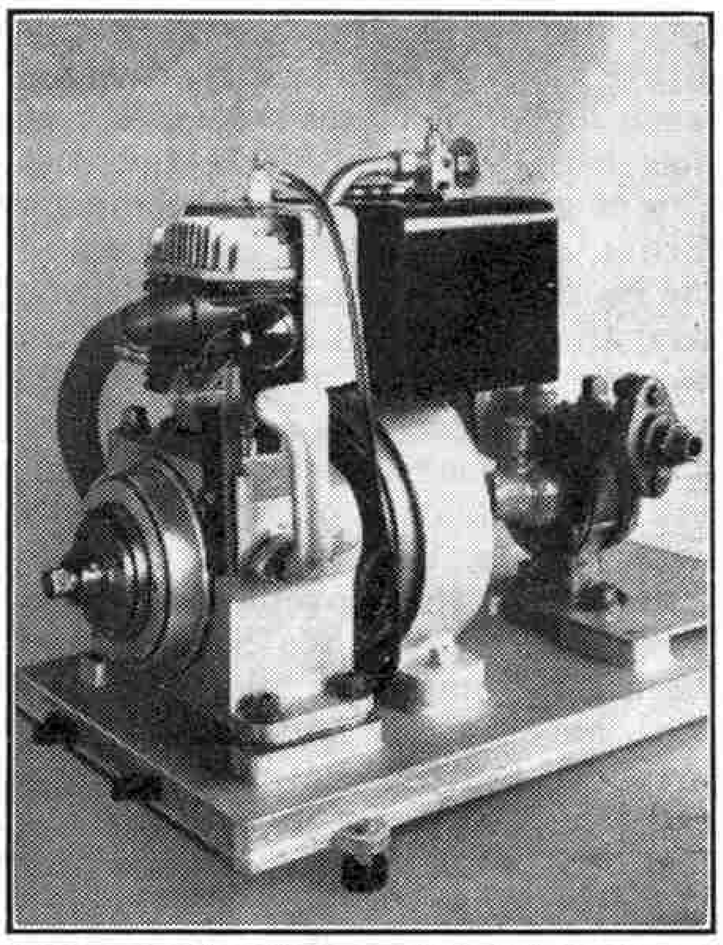
A new type of telephone cable now being made by a special process in America contains 4,242 separate wires, yet its outside diameter is no greater than that of a cable containing only 3,636 wires of similar gauge constructed by the normal method. This has been made possible by adopting a new process, whereby 0.003 in. is saved on the thickness of the insulation on each separate wire. The process consists of coating paper pulp on the wires instead of wrapping them with paper ribbon.



Another view of the unloading station of the aerial ropeway at Cyprus.

Portable Generating and Pumping Plants

The upper illustration on this page shows a "Pygmylyte" portable pumping plant, which together with a portable electric generating set is manufactured by Bradby's Engineering Works, London. The generating set is intended for farms, small dwellings, air-raid shelters, and other situations in which current is not available from mains, and can be used for lighting and battery-charging in isolated localities. The pumping unit is also useful on farms and in A.R.P. work, and consists of a centrifugal type pump direct coupled to a 1½ h.p. single cylinder four stroke petrol engine, both of which are mounted on a single aluminium baseplate. The pump has an output of 400 gallons an hour with a total head of 60 ft., and weighs only 70 lb.



A "Pygmylyte" portable pumping plant of the type referred to on this page. Photograph by courtesy of Bradby's Engineering Works Ltd., London.

The portable generating set is supplied either as a generating set only or in combination with the pumping unit. The dynamo has an output varying from 360 to 400 watts at from 12 to 32 volts according to type, and its windings are arranged so that in starting up the generator functions as a motor when energised from a battery. If the battery is completely discharged the engine can be started by a wire rope starter operating on a pulley on the engine shaft.

In cases where the generating set is employed and where pumping is also called for, a likely contingency in isolated areas, the engine of the generating set can be quickly uncoupled and connected to the pump, one engine thus serving two purposes.

A generating outfit of this kind proved of great value on the famous Houston-Mount Everest flight expedition, in 1933. The outfit was used on the expedition's aerodrome at Purmea, where it provided the entire supply of current for charging batteries and lighting the camp.

Apart from supplying light the generating set has many other uses, particularly on farms. For example it may be used as a motor-driven hedge trimmer. In this case it is fitted with a cutter consisting of a fixed blade and a reciprocating blade driven by a motor. This apparatus works at 12 volts, the current for the motor being supplied by the generator or the battery.

Scouting in Wartime

By Sydney Moorhouse, F.R.G.S.

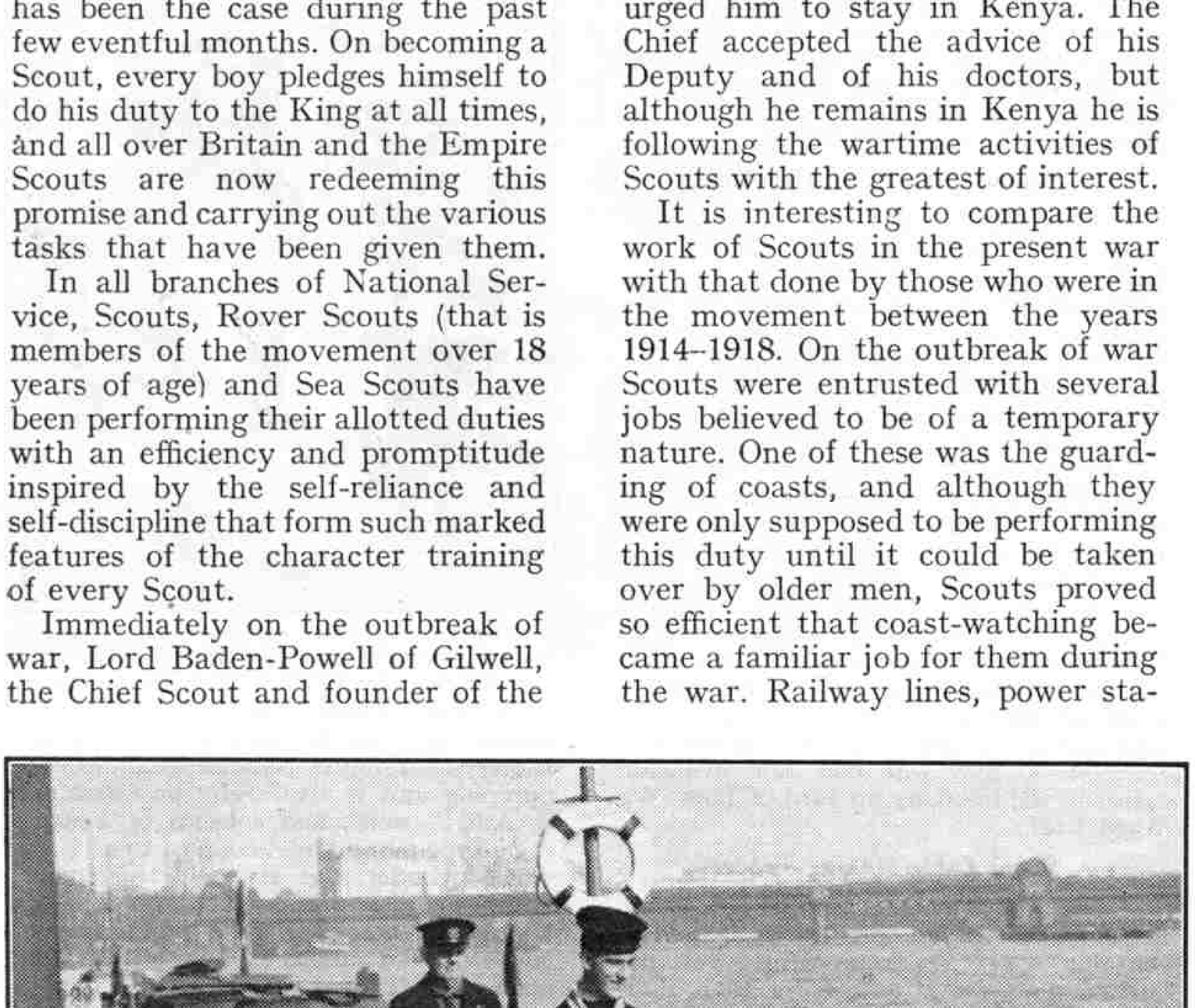
MANY fine tributes have been paid to the worth of the training provided by the Boy Scouts Association, but rarely has it received such high praise and recognition as has been the case during the past few eventful months. On becoming a Scout, every boy pledges himself to do his duty to the King at all times, and all over Britain and the Empire Scouts are now redeeming this promise and carrying out the various tasks that have been given them.

In all branches of National Service, Scouts, Rover Scouts (that is members of the movement over 18 years of age) and Sea Scouts have been performing their allotted duties with an efficiency and promptitude inspired by the self-reliance and self-discipline that form such marked features of the character training of every Scout.

Immediately on the outbreak of war, Lord Baden-Powell of Gilwell, the Chief Scout and founder of the greatest youth movement of all time, who is now in Kenya Colony, wrote to Lord Somers, the Deputy Chief Scout, expressing a desire to come home and lend a hand. This action was, of course, typical of the Chief Scout, who sets such a fine example to his youthful followers by always wanting to be in the very thick of things.

However, Lord Somers replied to say that the improved state of health in the Chief was due in no small way to the success of the medical treatment he is now undergoing, and urged him to stay in Kenya. The Chief accepted the advice of his Deputy and of his doctors, but although he remains in Kenya he is following the wartime activities of Scouts with the greatest of interest.

It is interesting to compare the work of Scouts in the present war with that done by those who were in the movement between the years 1914–1918. On the outbreak of war Scouts were entrusted with several jobs believed to be of a temporary nature. One of these was the guarding of coasts, and although they were only supposed to be performing this duty until it could be taken over by older men, Scouts proved so efficient that coast-watching became a familiar job for them during the war. Railway lines, power stations and reservoirs were similarly guarded.



Sea Scouts of the River Emergency Service at Ambulance practice.

First Aid detachments were raised, and Scouts were found to be expert bandagers. Despatch runners rendered valuable service throughout the country, and other watch patrols were entrusted with the guarding of culverts and tunnels. Funds were provided that enabled Scout huts to

A Boy Scout on A.R.P. duty, having his lunch at his emergency telephone post.

be set up in France, that at Etaples being a well-known example; and Scout ambulances also became a familiar feature of the Western Front.

It is mainly because Scouts proved to be of such service to their country during the Great War that plans were made to use them even more thoroughly in the event of another conflict, and at the present time Scouts are undertaking important work on the home front.

One of the biggest jobs being tackled is organised in conjunction with the Thames River Emergency Service, an A.R.P. organisation under the control of the Port of London authority, and whose members are drawn from people who know the river well and can handle boats on it. Sea Scouts are used as signallers, and man stations commanding every section of the Thames from Putney to the Nore. At each station Sea Scout signallers are on duty day and night, while others accompany boats on patrol work and maintain contact with the stations, boats and hospital ships.

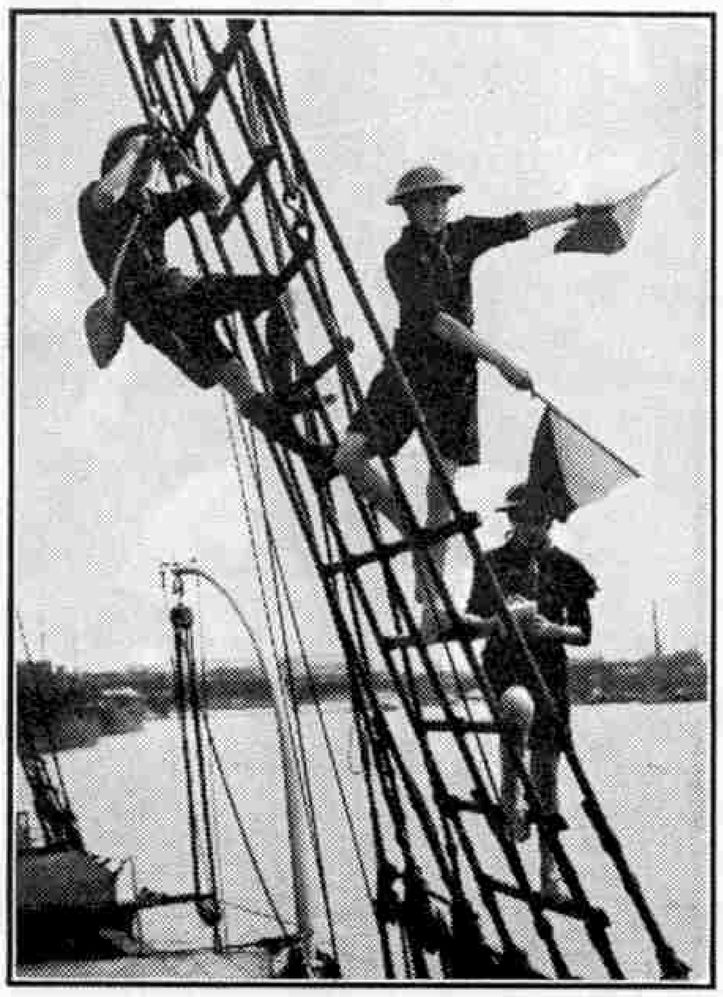
"Somewhere in Kent" a party of Sea Scouts keeps a constant watch from the top of a watchtower in much the same way as did Scouts during the previous war. The tower commands two long stretches of the river, and three miles of lonely marshland separate it from the nearest house. The Sea Scouts are on duty for a month at a time and then get a week's leave, but there are no signs of boredom manifested on

those stationed at this isolated spot.

Sea Scouts, of course, are collaborating with the coastguards at numerous places, some having kept a 24-hour service in full operation since 9 a.m. on the fateful 4th September last.

Since the Nazis commenced their disgraceful attacks on shipping by using magnetic mines, Scouts have been asked to be specially alert, and to inform the nearest Coastguard or Police Station of any suspicious-looking object they find washed up on the shore.

Not only are Scouts doing work of National importance on the coasts, however, but practically every troop in the British Isles is taking part in the collecting of waste paper, a task undertaken at the request of the Government. To every Scout a request from the Government is a request from the King, and when those in authority asked Scouts to make a special effort to gather in all waste paper, lads in every troop rolled up their sleeves and immediately got to work. Waste paper is especially valuable in wartime, for it is the most useful substitute for wood pulp, or cellulose, the shortage of which is already acute. Scouts, therefore, have undertaken to collect newspapers, periodicals, magazines, books, wrapping papers, cardboards and cartons; and householders, shop keepers and owners of factories and works of all descriptions are being canvassed for their supplies of waste paper. Practically every local Scout Association has established a central depot where the paper is stored and packed into bales for disposal to dealers.

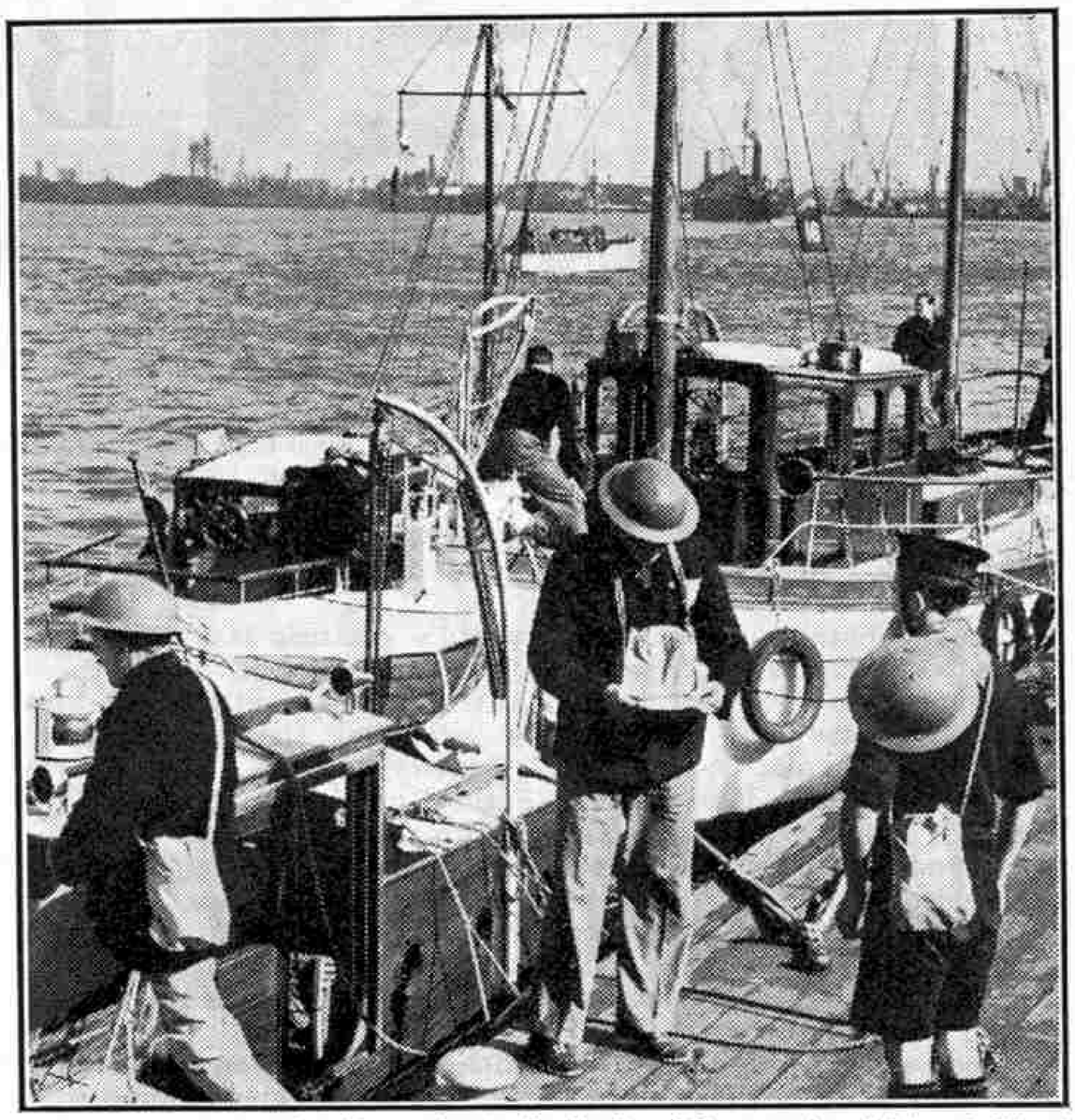


"Somewhere in the Thames" they send and receive messages.

In addition to collecting magazines for the purpose of repulping, many districts have opened depots where recent issues can be taken, and these are being sent out to members of His Majesty's Forces, either serving abroad or engaged on some work of home defence. Elsewhere Scouts have undertaken to collect lead and silver foil and have set themselves a standard of one hundredweight of foil a month.

Every Scout is expected to perform at least one good turn each day, but during wartime not only individual but troop good turns form a strong feature of the Scouting programme. In one place, for instance, members of an Anti-Aircraft Unit are billeted on a Scout camp site, and not only are they being allowed the use of the huts built by the boys themselves, but the Scouts have also loaned their cooking utensils and other gear. In another district, an agricultural one, Scouts are digging up the potatoes belonging to the men called up, providing rotas of helpers for milk rounds, and assisting dairy farmers in milking their cattle.

Scouts in a certain Yorkshire town are helping to minimise the dangers of motoring in the "black-out," and armed with buckets of lime and brushes they keep a rota going to smear street corners, doorways, posts and trees. In a Midland town an urgent request was received to supply Morse signalling flags to an Anti-Aircraft Unit; 18 flags were supplied right away, and sufficient to meet the demand within a few hours. The request was followed by another one. Could the Scouts supply help in Morse instruction? They could, and a Scout instructor has been supplied every morning since the request was made.



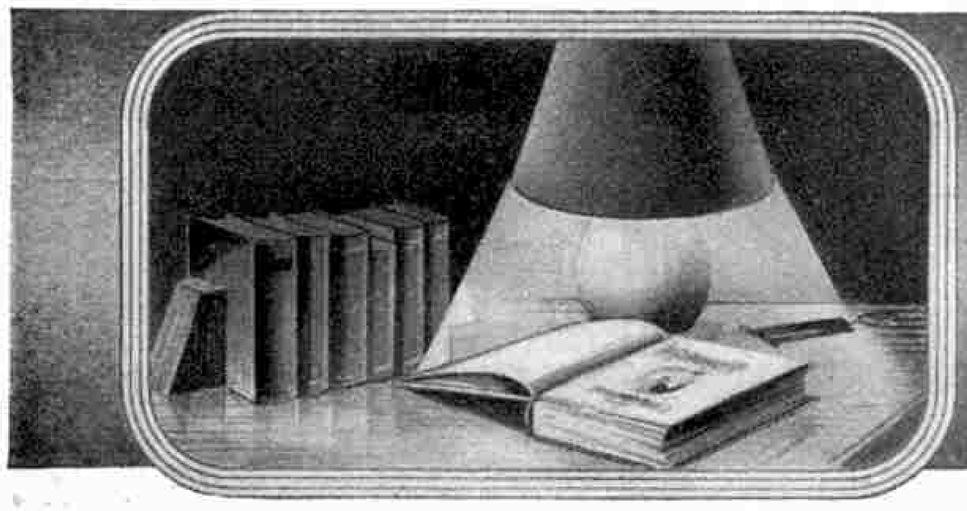
A Sea Scout delivers air-raid warning to the Section Officer, on board his patrol boat and a suitable flag is hoisted.

Naturally, messenger work is one of the principal jobs given to Scouts, and in some areas Scouts are completely responsible for the services maintained by the Air Raid Precaution authorities. In one Welsh district Scouts were asked to deliver messages to every Police Station in the county. The officer-in-charge had anticipated that this would take all day, but when he returned three hours later he found, to his great surprise and delight, that the whole of the county had been covered and the messages safely delivered.

The difficulties of evacuation were lessened in many districts by the collaboration of Scouts who took parties in hand and guided them to their billets.

Empire Scouts, like their brother Scouts at home, have also responded to the call for National Service. In Malta, for instance, over 200 Scouts between the ages of 15 and 19 have volunteered for service as Messengers, Coast watchers and orderlies, while others are engaged in civil defence schemes such as blood transfusion, evacuation control and first-aid duties. The younger boys are doing such duties as fitting gas masks, answering black-out queries and blueing car lights.

These are but some of the ways in which Lord Baden Powell's Scouts are doing their bit. They are living up to the Scouts' motto: "Be Prepared."



BOOKS to READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"Tours and Tests"

By KENNETH FARNES. (R.T.S. 6/- net)

Kenneth Farnes is one of the world's greatest fast bowlers. In his book he has set down a record of his experiences on the cricket field, in the West Indies, Australia and South Africa as well as at home, and every reader will enjoy the glimpses he gives of many great occasions and great cricketers.

Cricket seems to have been in Farnes' mind from his earliest boyhood, and he soon made his way into club and County games. In his first match for Essex he took no wickets, made eight runs and fielded badly! Not a very auspicious start, perhaps, but he was called upon again a few weeks later. Then he went to Cambridge, abandoning his original intention of a career in banking in favour of teaching. This was certainly a good thing for England, as well as for Essex.

Farnes was now well set on his cricketing career, and we read story after story of matches of all kinds. All the great games in which he took part, particularly the Test matches at home and overseas, are thrillingly described, but not for the sake of emphasising his own share, for the author is distinctly modest and his accounts are full of the great deeds of others, whose great efforts are fittingly recognised. Thus he tells how he received a terrific trouncing from Sutcliffe, and pays tribute to his club mate Nicholls and many other great figures of the cricket field. Thus we read of Bradman making centuries in his own free scoring style, and also of a dour and patient innings from him that contributed largely to a Test victory. There are Hutton's record breaking Test Match score at the Oval in 1938, splendid innings by Hammond, Leyland and others in England, Australia and South Africa, and the great bowling achievements of such men as Verity, O'Reilly and Fleetwood-Smith. Every great international match of the last 10 years passes in review before the reader.

Besides the stories of famous cricketers and great cricketing occasions that the book gives us we have also records of journeys across the world to Australia, South Africa and the West Indies, and attractive pictures of the lighter moments of touring parties in these lands. Altogether the book is a delightful one, pleasant to read, or to dip into, either on a summer afternoon or by the fireside when recalling the outstanding moments of the national game. There are 21 photographic illustrations.

"The Design and Construction of Flying Model Aircraft"

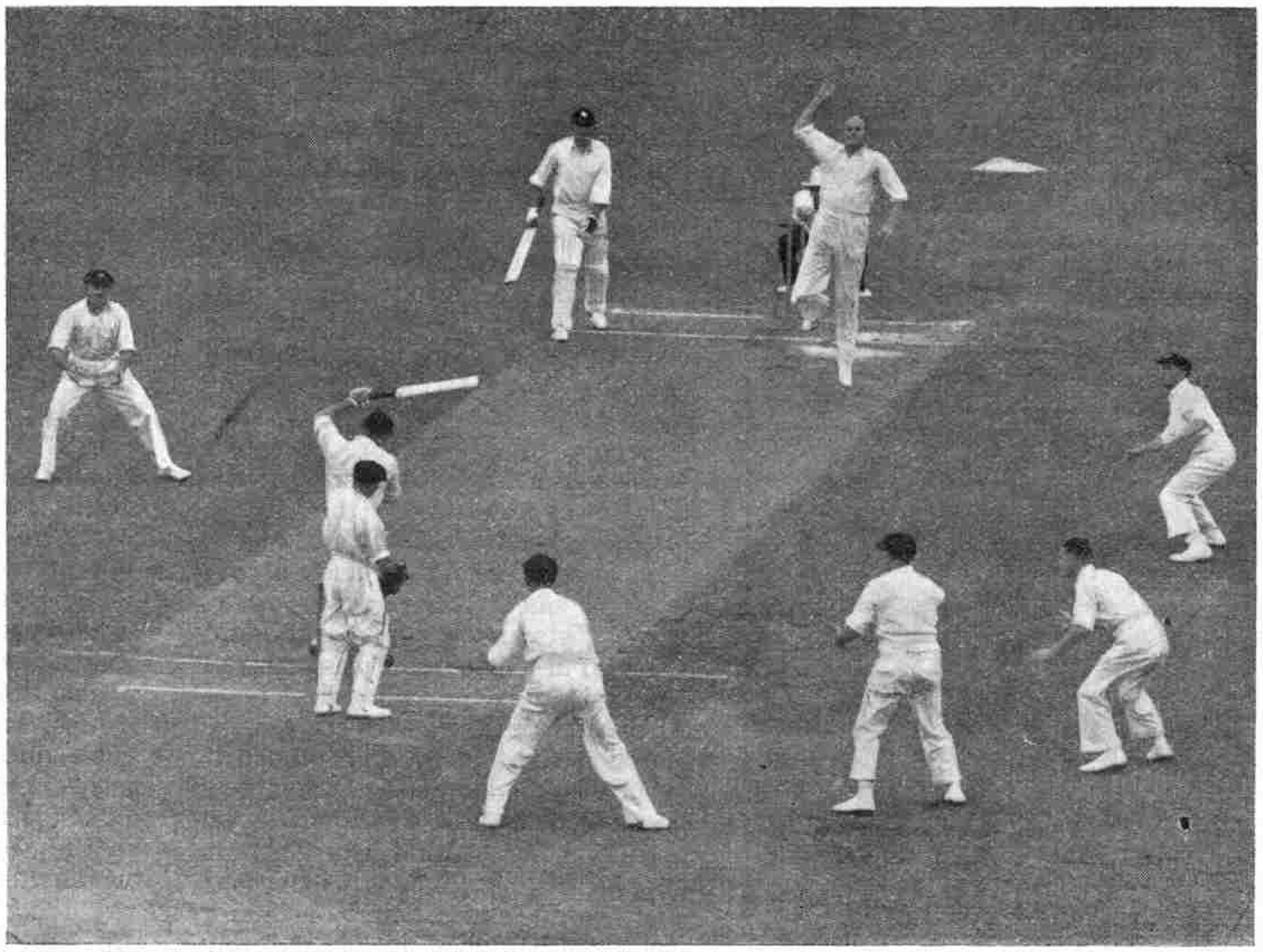
By D. A. RUSSELL, A.M.I.Mech.E.
(Harborough Publishing Company. 6/6 net)

Mr. Russell is an experienced designer and flyer of model aeroplanes, and the practical value of his book is shown by the fact that the present is the second edition, a considerably enlarged and extended version of the first. Everything for the designer and constructor of model aircraft, whether driven by small engines or rubber motors, is to be found in the book. The reasons and theories behind design and construction are simply explained, and their application in the development of new types illustrated.

The author begins with the consideration of airfoils, fuselages and control surfaces, and shows how time and money are saved by calculating performance before construction, a plan that often points the way to successful modification in design. Airscrews and motors, both rubber and petrol, are then dealt with, and there are useful chapters on landing gear, wind tunnel testing and engine testing and tuning.

A feature of the very greatest importance is that model aircraft design on the lines described by Mr. Russell provides magnificent training for full size construction. Everything that can encourage such a valuable hobby therefore should be developed as far as possible. The author has proceeded with this in mind, and encourages constructors to design their own aeroplanes. He provides them with formulæ and tables that will enable them to carry out their calculations, as well as with countless practical details of construction that will ensure their work being of the highest quality.

The book has 123 half-tone illustrations and drawings.



O'Reilly bowling to Hammond on the sticky wicket in a Test Match at Melbourne. From "Tours and Tests," reviewed on this page.

"Lords of the Air"

By HARRY HARPER. (R.T.S. Lutterworth Press. 8/6 net)

The romantic history of aviation has been told many times. Here Mr. Harper, who has been described as "Britain's foremost historian of the air," tells it again, but in a more personal vein, for it is in large measure the story of his life as an air correspondent during the past 20 years or so. During a career that has brought him more thrills than he can remember he has known many of the pioneers of flying, and he tells of their triumphs and failures in the face of difficulties and scepticism.

Grahame-White about to take off in an early type of Bleriót monoplane. From "Lords of the Air," reviewed on this page.

The author has both seen and taken part in many historic incidents. He saw the world's first aeroplane in flight, and talked with Orville and Wilbur Wright, the first men to fly them. He was on the shore at Les Baraques, near Calais, in the early morning of 25th July 1909 when Louis Bleriót, that great French air pioneer, took off on what proved to be the first successful flight across the English Channel to Britain. Mr. Harper was present also at the world's first air meeting at Rheims in 1909. He followed Paulhan and Grahame-White in the famous London to Manchester air race that thrilled the world in 1910, and has stirring stories to tell of Vedrines, Farman, Cody and Gustave Hamel and other famous pioneers.

During the war of 1914-18, Mr. Harper gained a valuable inside view of the first use of aircraft in any big campaign. Afterwards he joined Mr. G. Holt Thomas, the great air transport pioneer, in establishing the world's first commercial air line between London and Paris. From this small beginning there developed the wonderful network of Empire air routes of to-day, and in touching upon this thrilling chapter in British commercial aviation the author gives interesting pen pictures of Sir Alan Cobham, the late Bert Hinkler, Amy Johnson, and other pioneer long-distance flyers.

There are nearly 60 half-tone illustrations.

"Man of Power"

By IVOR B. N. EVANS. (Scientific Book Club. 2/6)

This is a book that will interest and enthrall our older readers. Lord Rutherford's story is one of the romances of achievement. He was born in a cottage in the depths of the New Zealand forests. He soon showed that he was not destined for an undistinguished country career, however, for he displayed tremendous energy and great ability both in school and out, and at length won a University scholarship.

This step forward was the beginning of one of the most prolific scientific lives ever known. Rutherford's brilliant experiments revealed the inner constitution of the atom, and eventually he realised the alchemist's dream of transmutation by bombarding atoms with smaller particles moving at incredible speeds. He also had the power of inspiring those who worked along with him, and in their turn these have made exciting discoveries.

Besides telling this story the book introduces us to Rutherford himself. He was a genius, comparable with such giants as Bacon, Newton and Faraday, and the most outstanding scientific personality of his age; yet he was kindly and modest, and throughout his life retained the Colonial geniality and bluffness that he inherited from his parents.

The book contains a portrait and eight full-page plates.

"Stirring Tales of Britain's Naval Might"

By CAPTAIN FRANK H. SHAW. (Harrap. 7/6 net)

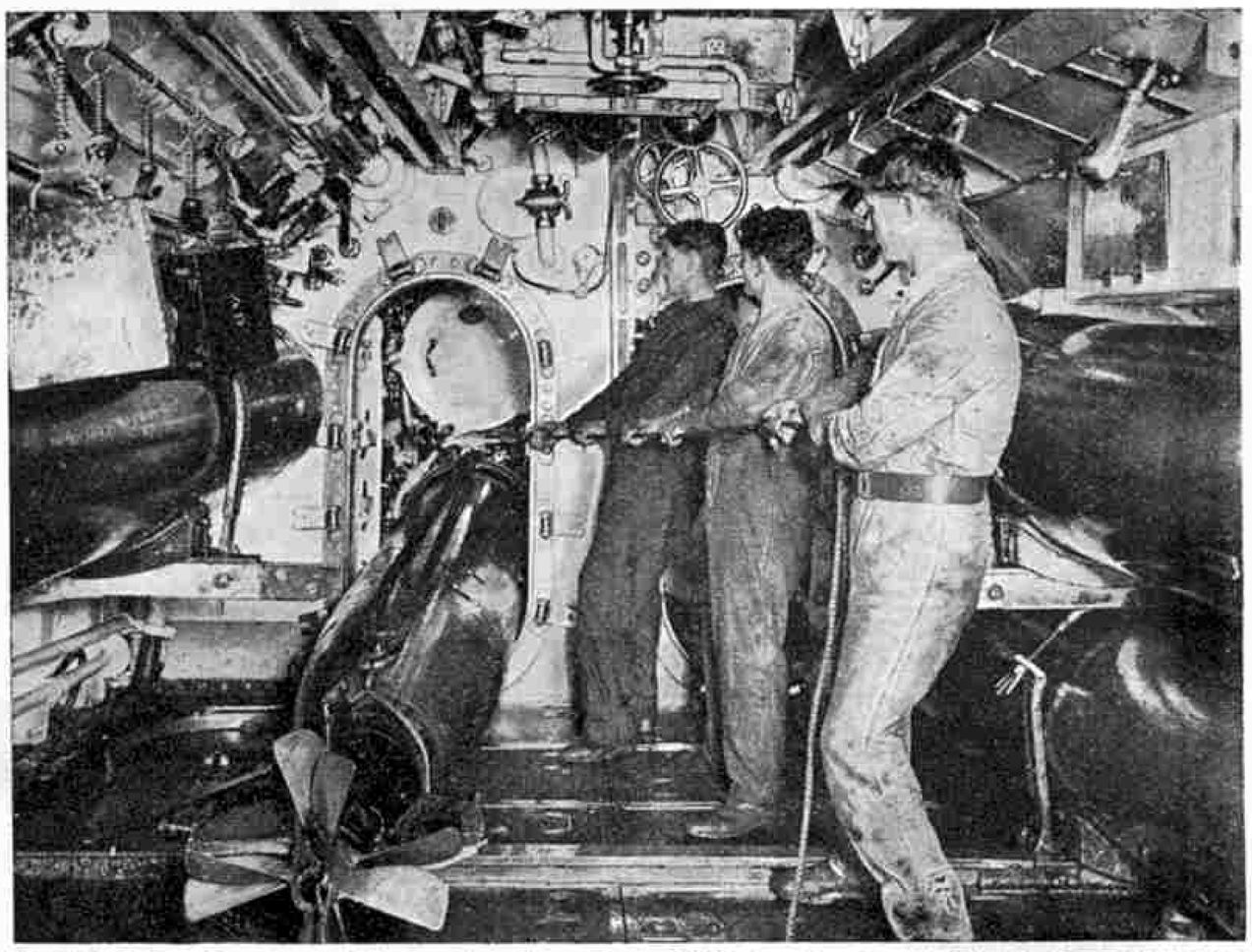
During the first few months of the war it was the British Navy that loomed largest in the news. It fought submarines and mine-laying craft, organised convoys and generally kept the seas free for merchantmen of the Allies and neutrals alike, besides blockading German ports and maintaining untiring watch over enemy activities of all kinds. How this was done is splendidly told in Captain Shaw's book, which is full of amazing stories of dashing assaults and brilliant victories by which our seamen are maintaining Britain's proud record, and is finely illustrated.

The story begins, as naturally it should do, with the Battle of the River Plate, an occasion that illustrates to the full the daring spirit of British seamen. Every detail of the fight is brought vividly home. We see how Commodore Harwood with his cruisers combed the South Atlantic for the pocket battleship known to be at large, while working out his scheme for putting an end to her activities. Then came the moment when the *"Graf Spee"* was recognised and immediately attacked. We read how, without thought of punishment, the three British cruisers fought and manœuvred, closing the range with astonishing boldness in order to make their lighter guns felt, and in spite of heavy loss so bewildering the German Commander that he was compelled to seek safety in flight into neutral waters, and eventually to blow up his ship rather than face the smaller but terrifyingly audacious cruisers that waited for him to emerge.

Next comes the fight of the *"Rawalpindi."* This is likened by Captain Shaw to the famous struggle of the *"Revenge,"* which was only battered into defeat by the combined efforts of 50 Spanish warships. An unarmoured merchant ship, fitted with 6 in. guns, the *"Rawalpindi"* refused to fly when attacked by the *"Deutschland,"* of greater speed and armed with 11 in. guns, and by an enemy cruiser, but fought the battle out in spite of the heavy odds against her, until she was a broken wreck blazing from stem to stern.

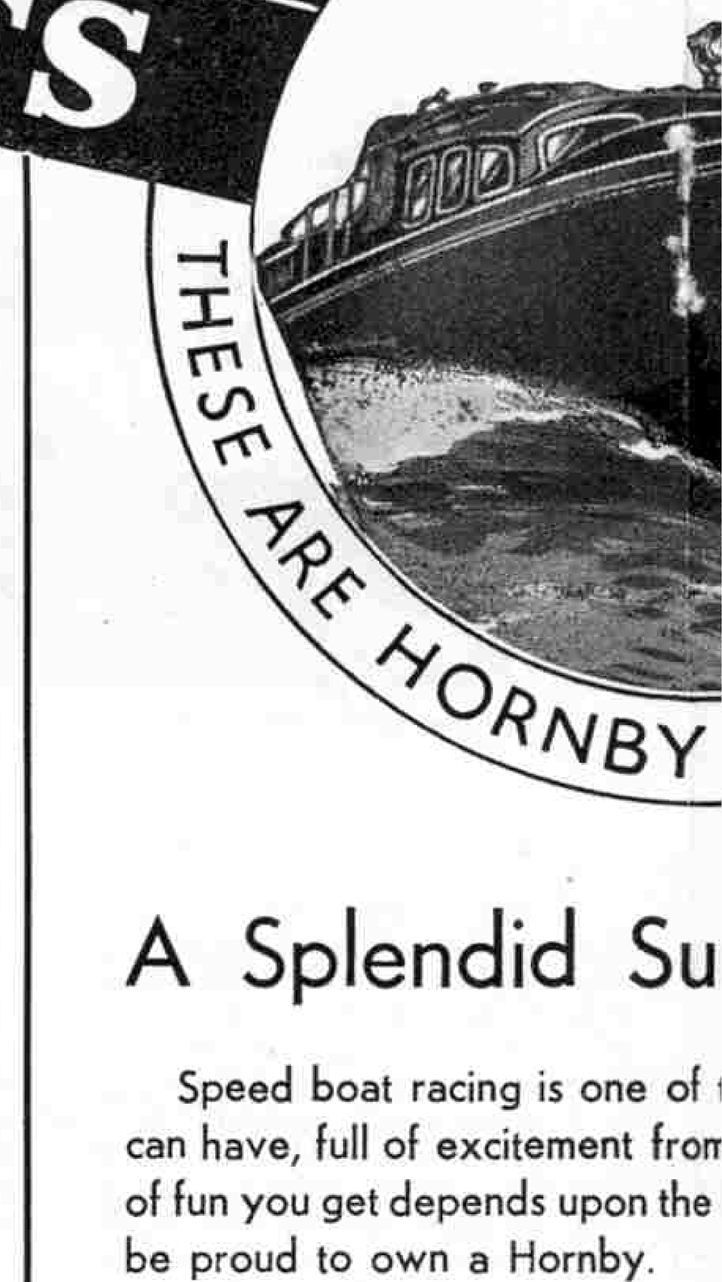
Another outstanding story that Captain Shaw has to tell is that of the rescue of 300 prisoners from the prison-ship *"Altmark"* in a Norwegian Fjord, when the stirring cry *"Boarders Away"* was heard again in the Navy and answered by the men of the *"Cossack"* with the same dash as those of Nelson's day.

There are many other inspiring stories in the book. We read of the deeds of merchant seamen faced with the destruction of their ships by torpedoes and mines, and of fishing vessels raked with machine-gun fire from the air, but fighting back with the machine guns with which they had to be supplied to protect themselves. We learn how British submarines carry out their patrols, and of their remarkable successes in the enemy's own waters. How the *"Orzel,"* the Polish submarine, now unhappily reported lost, ran the gauntlet of German submarine chasers in the Baltic Sea and finally escaped to this country also is told, and there are splendid chapters on life in destroyers and smaller vessels, and on the making of officers and men of the Royal Navy.

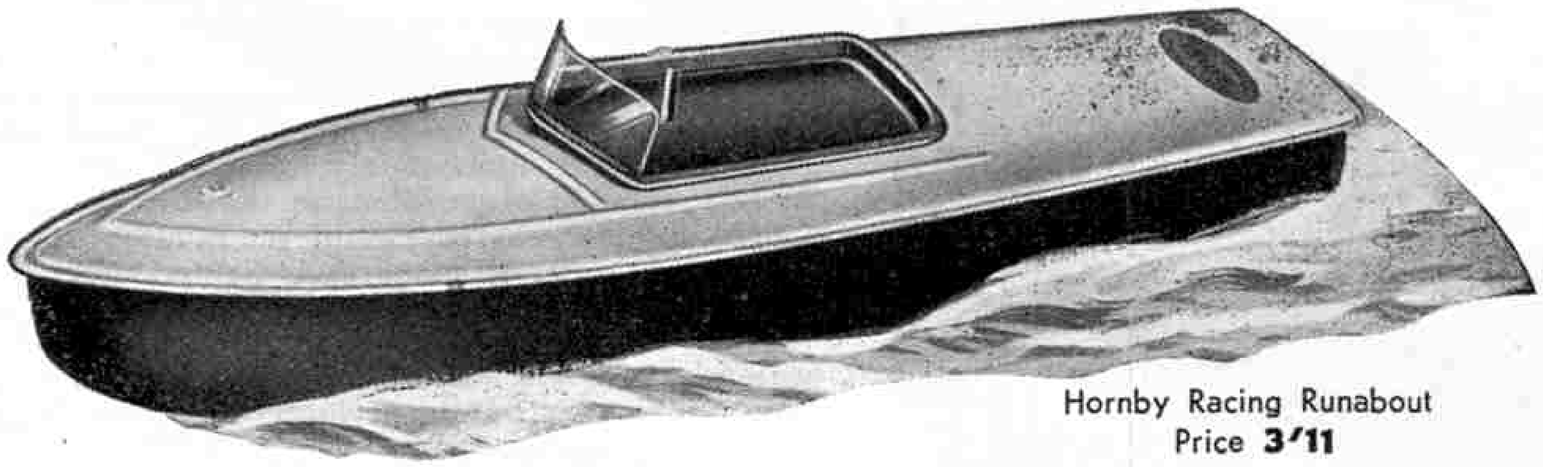


Handling torpedoes in a British submarine. From "Stirring Deeds of Britain's Naval Might," reviewed on this page.

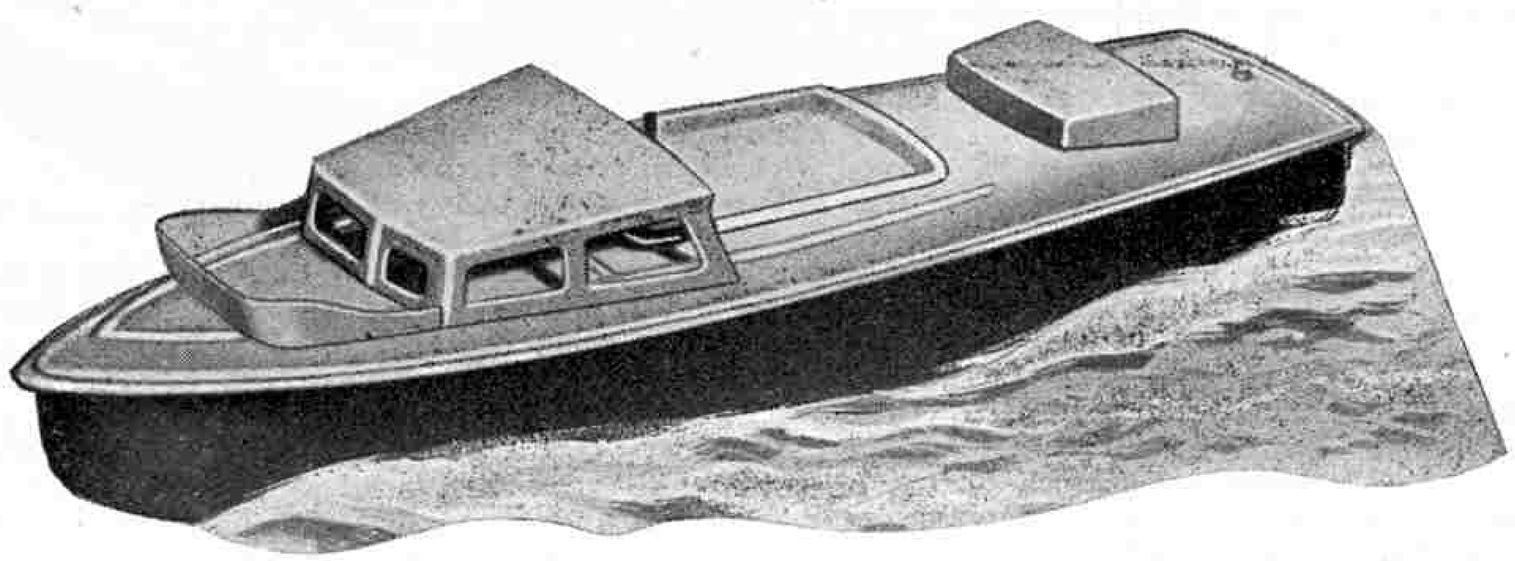
SPEED BOATS HOR



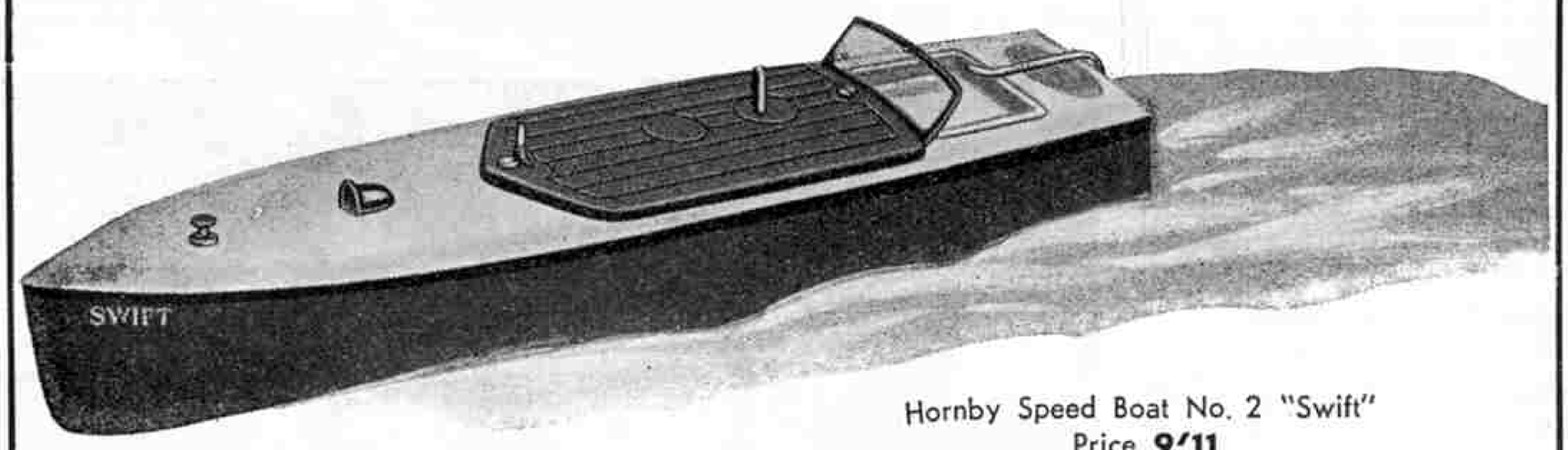
THESE ARE HORNBY



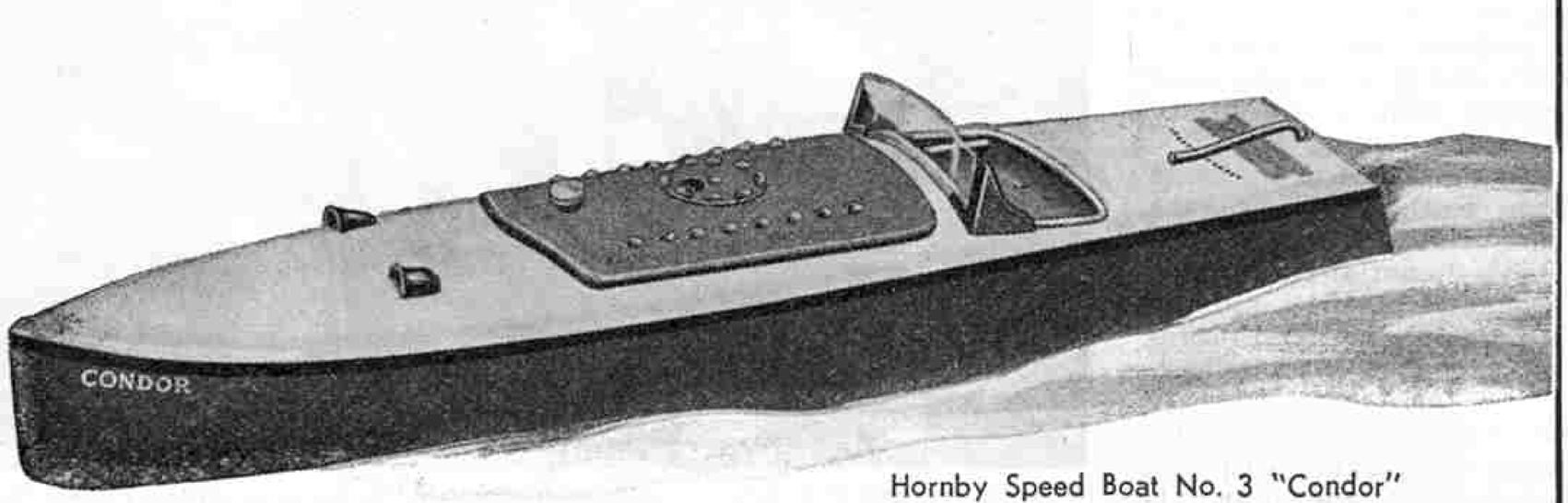
Hornby Racing Runabout
Price **3'11**



Hornby High Speed Launch
Price **4'11**



Hornby Speed Boat No. 2 "Swift"
Price **9'11**



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Hornby No. 2 Racing Boat "Racer II" each **10'9**

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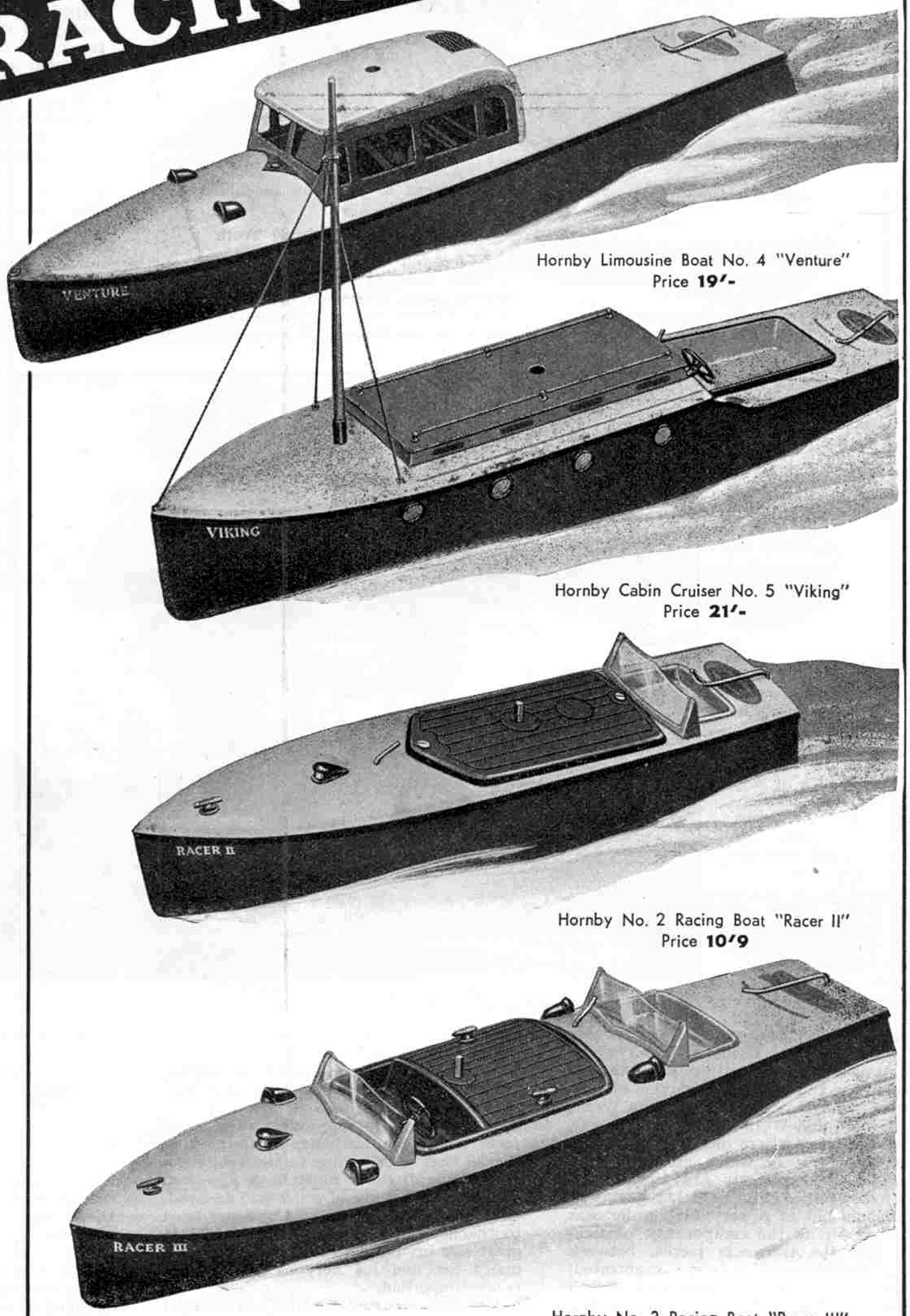

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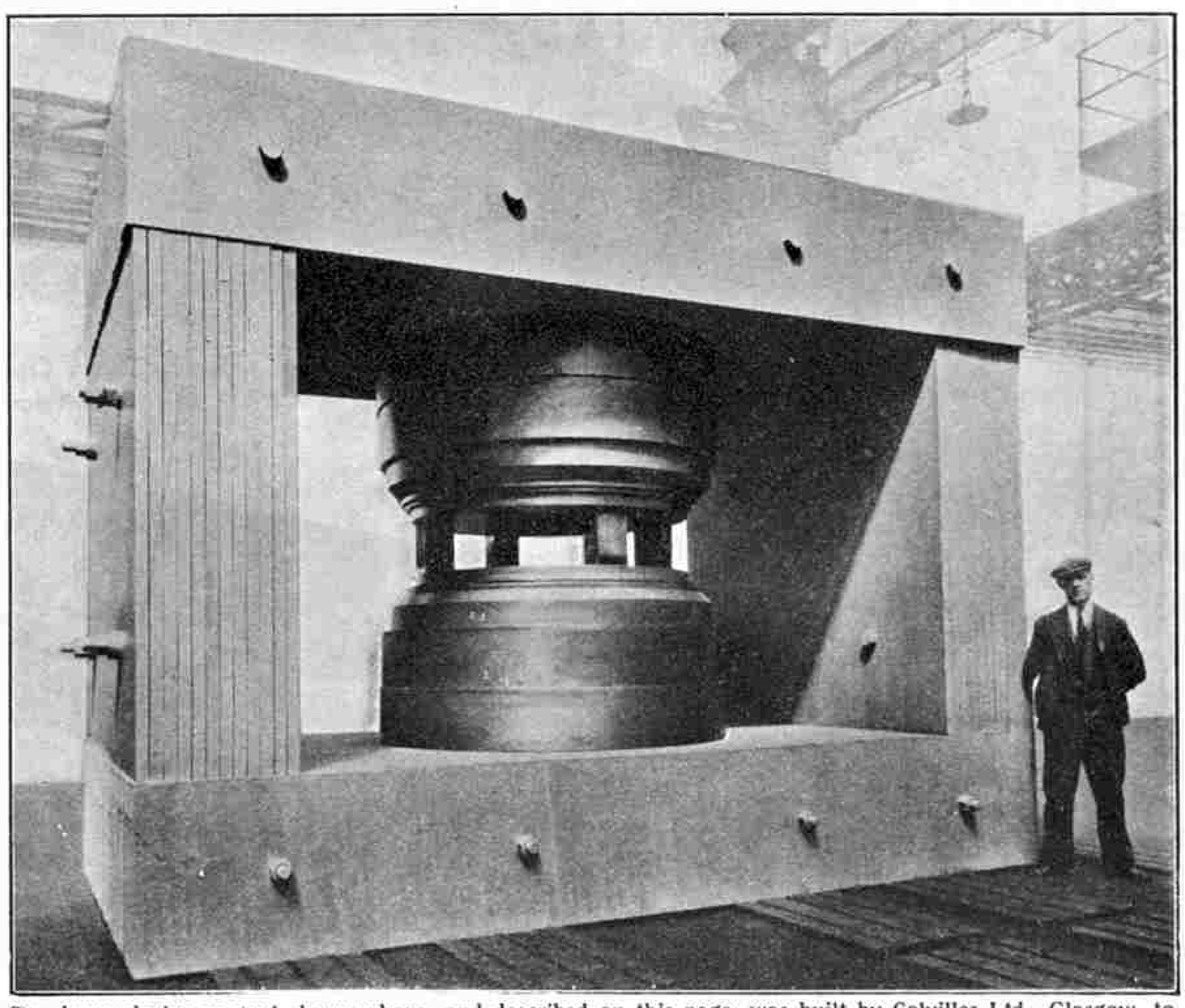
Of General Interest

A Giant Electro-Magnet

A giant magnet is always of great interest, and the enormous electro-magnet illustrated on this page is of special importance. It was recently constructed by Colvilles Ltd., Glasgow, for the Department of Physics of the University of Birmingham, where it is to be used in experiments in which atoms are bombarded by tiny particles in order to break them up and transform them. It is strange to think that such a huge magnet should be required for the purpose of studying electrons, protons and the other particles of which atoms are built up, for these are so small that they are invisible in the most powerful microscope yet invented.

The size of the magnet is indicated in the illustration by the figure of the man standing alongside. The structure is 12 ft. 3 in. in height, and has a length of 15 ft. 7 in. and a breadth of 8 ft. The whole mass weighs practically 230 tons. The base, side supports and upper bridge pieces are built up of plates 2 in. in thickness, and there are sufficient of these to make a path 2 ft. wide and almost half a mile long. All the metal used in the construction was produced and roughed to shape at the Dalzell Works of Colvilles Ltd., Motherwell, but owing to production necessities the finished machining and assembly of the magnet were carried out at the Finnieston Works of Harland and Wolff Ltd.

As the magnet was designed for use in scientific work, in which extraordinarily accurate measurements are essential, it had to be finished with the highest accuracy. Craftsmanship of a very high order was required for all the components, particularly for the two pole pieces, between which the magnetic field is concentrated. These were required to have dead smooth surfaces, and to be flat and parallel within a limit of one or two thousandths of an inch, and to attain this high standard over areas 6 ft. in diameter was a great achievement in precision machining and finishing.



The huge electro-magnet shown above, and described on this page, was built by Colvilles Ltd., Glasgow, to whom we are indebted for our illustration. The weight of the electro-magnet is about 230 tons.

Reptile that had 500 Teeth

A five-ton dinosaur that roamed the western part of the United States 80 million years or so ago has just had his teeth X-rayed. His jaw was removed from the American Museum of Natural History, New York, where it is normally on exhibition, to the works of the Westinghouse X-ray Company. There it was photographed by means of X-ray apparatus that is used in industrial work, and it was then discovered that there were four rows of uncut teeth inside the jawbone, in addition to the 36 that were visible to the eye. Altogether this dinosaur must have possessed over 500 teeth, some of which had decayed. It is scarcely likely that he suffered from toothache, however, for in spite of his great size his brain was only the size of a man's fist and his nervous system was poorly organised.

The dinosaur jaw-bone that was X-rayed in these experiments came from the lower left side of the mouth of a creature to which the formidable name of Triceratops Serratus has been given. It was dug from soft sand in Montana, a position suggesting that the creature had wandered into a quicksand and died when unable to struggle free. He is estimated to have been 50 years old when he came to this untimely end, and had then completed only a quarter of the average life of his kind. He stood 8 ft. high, and a tremendous shield stretching backwards from his head helped to protect his neck from his mortal enemy, a carnivorous dinosaur. He had two horns, each about 3 ft. in length, that projected forward over his little eyes, and a much smaller horn between his nostrils.

X-rays are proving particularly useful for examining rare fossil remains of this kind. Previously what was inside them could only be discovered by sawing "windows" out of the bone. Now they can be examined without injury, and arrangements have been made for fossil finds of explorers on behalf of the American Museum of Natural History to be X-rayed by the Westinghouse X-ray Company.

Books by Slot Machine

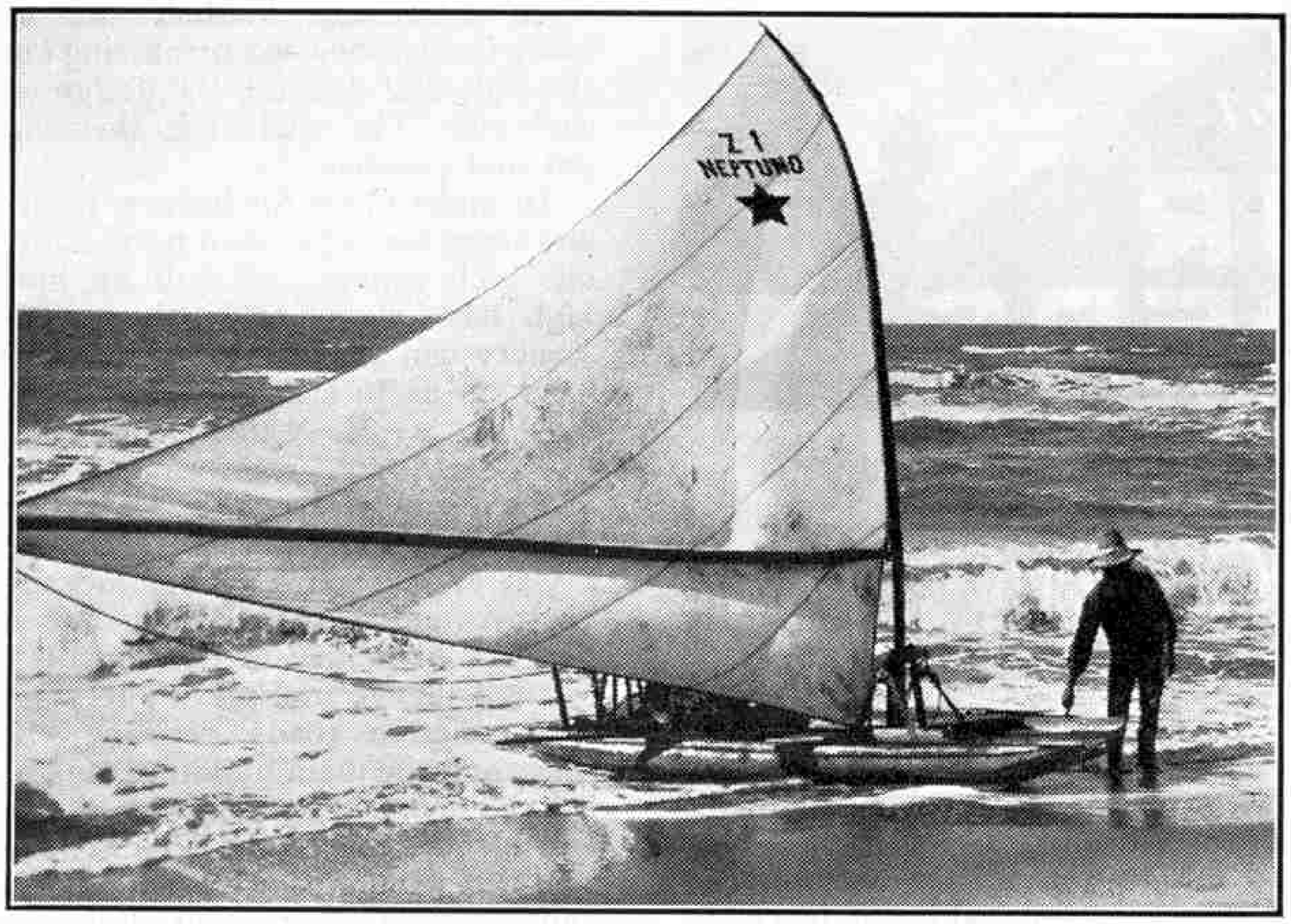
There seems no limit to the variety of articles that are sold from slot machines in the United States. From these one can get insurance policies, hard-boiled eggs and talking letters on gramophone records that come out ready for posting after the purchaser has spoken into the machine. The use of typewriters, with paper and stamp, also can be obtained by just dropping a coin in a slot.

Now books can be bought in this manner. Each machine fitted for this purpose holds 600 books, showing 18 titles in each machine, and enormous orders have been given for a special series of books published at 10c. or about 6d., to be sold from them. Careful trials have already given excellent results.

"Life-Light" for Increased Safety at Sea

Readers of the "*M.M.*" do not need to be reminded how danger at sea has increased since the outbreak of war. The work of rescue ships and life-boat crews, which is sufficiently difficult in daylight, becomes almost impossible at night. The Ministry of Shipping therefore considered the possibility of replacing the old type of calcium flare, which bursts into flames on coming into contact with water, by an electric lighting device. The need for the change was particularly urgent in the case of oil tankers and of ships driven by Diesel engines, from which quantities of oil might be released to float on the surface of the water. A calcium flare might ignite the oil, with disastrous results.

The General Electric Company Limited designed a suitable type of apparatus to comply with the Ministry's requirements, and as a result an emergency floating light known as the G.E.C. "Life-Light" is now



A fisherman of the Brazilian Northern Seas with his jangada, the primitive craft in which he sails great distances. Photograph by courtesy of the Brazilian Consul, Liverpool.

in production. This has passed the severest tests, and has been fully approved. It should be the means of assisting in the saving of life at sea, both by guiding survivors to buoys or rafts and by enabling rescuers to find them.

The G.E.C. "Life-Light" is a metal cylinder containing the lamp, dry cells and an automatic switch, and is equipped with a buoyancy chamber or float. The device is stowed in the inverted position, and the light is switched on by turning the cylinder right way up. The "Life-Light" floats in this position when thrown into the water, and as its light is at least 6 in. above the surface it is visible from a considerable distance.

The lamp is equipped with two 1½ v. cells, and will remain lighted for more than 20 hrs. When the device is used on a raft or in a life-boat it can be inverted during the day, in order to economise on current, and in these conditions the light will last for three nights of 10 hrs. each.

The "Life-Light" has many other applications of interest. For instance, it can be used as a marker buoy. Without the float it makes an excellent emergency lighting device in ships. It is then brought into action by lifting it off its hook, from which it hangs in the inverted position, and turning it upright before hanging it up again.

Painting Pictures by Compressed Air

An American commercial artist has trained himself by steady practice to paint pictures with spray guns instead of brushes. With compressed air shooting the paint on to his canvas he works quickly and can complete a landscape in about five min. Seascapes take him longer, from 20 min. to 1½ hrs. He has painted as many as 1,500 pictures in a year.

The artist began this new way of painting by making a rough sketch on the wall of an industrial paint shop. He became interested and began to practice, learning how to control the trigger so that he could paint fine lines and obtain other effects that previously could only be achieved with a brush. He uses no stencils, simply varying the triggering. Pulling back the trigger to the limit with the gun held near the canvas gives a big splash, but years of practice have enabled the artist to know just how far back to pull so as to get the effect he wants.

In painting a picture five to ten spray guns are used, each charged with a separate colour. A thin colour sprayed at a pressure of 35 lb. per sq. in. is used when sky effects and delicate tones generally are required, and for opaque effects heavier paint is applied at a pressure of 60 lb. per sq. in.

Echoes

There is no echo that behaved like the one described by Mark Twain, which talked back for a quarter of an hour when a single word was spoken to it, nor are there echoes that will only speak in one language. Many astonishing stories are told about echoes in various parts of the world, however, and they are remarkable enough to need no exaggeration.

The most famous of all echoes are those of whispering galleries, such as the dome of St. Paul's Cathedral in London. There a whisper will creep round the walls of the dome from one side to the other, where it can be heard plainly although the distance between this point and the original of the whisper is 102 ft. An equally remarkable echo comes from a tomb near Rome, where the effect is delayed and the experimenter can recite a long line of poetry without interruption from it, the echo waiting until the end before repeating it. In this Italian example the reflecting surface must be at a great distance, for sound travels a mile in about 5 sec. An echo that returns after 5 sec. therefore must come from a surface half a mile away.

There are other echoes that seem to change the pitch of the sound before returning it. Actually they pick out these tones. Thus a reflecting surface of small size will return sounds of short wave length, while the long sound waves will overlap it and pass on. There is an echo of this kind in Killarney, where notes played on a bugle appear to come back an octave higher, forming a ghostly sort of accompaniment.

It is even more remarkable how echoes reflected from many distant surfaces give by their combined volume a sound louder than that of the original heard coming in one direction. It is said that on one occasion Mexican bandits trapped in a mountain pass took advantage of this to overawe their pursuers. After discovering that echoes from the rocky hills round them multiplied the volume and apparent number of their voices they yelled and shouted together, until the enemy was deceived into believing that they were far more numerous and widely scattered than they were in reality.

Rainy Days

Weather in Great Britain has always been regarded as something of a joke because of the amazingly rapid way in which conditions can change, and of the surprisingly different varieties of weather that places near to each other are called upon to endure. Thus rainfall may vary considerably, even in places that are only a few miles apart. The regions of lowest rainfall in Great Britain appear to be round the Thames Estuary and the Firths of Tay and Forth, and the largest totals are recorded on Dartmoor, in North and Central Wales, in the Lake District and in North-West Scotland. In most parts of Great Britain December is the rainiest month, but for some unknown reason October possesses this distinction on parts of the East Coast, round the Severn Estuary and in the Isle of Wight.

A point that must be made clear is that a district may have a high rainfall with a comparatively small number of rainy days, and vice versa. The number of days on which rain can be expected increases as one travels from Kent north-westward

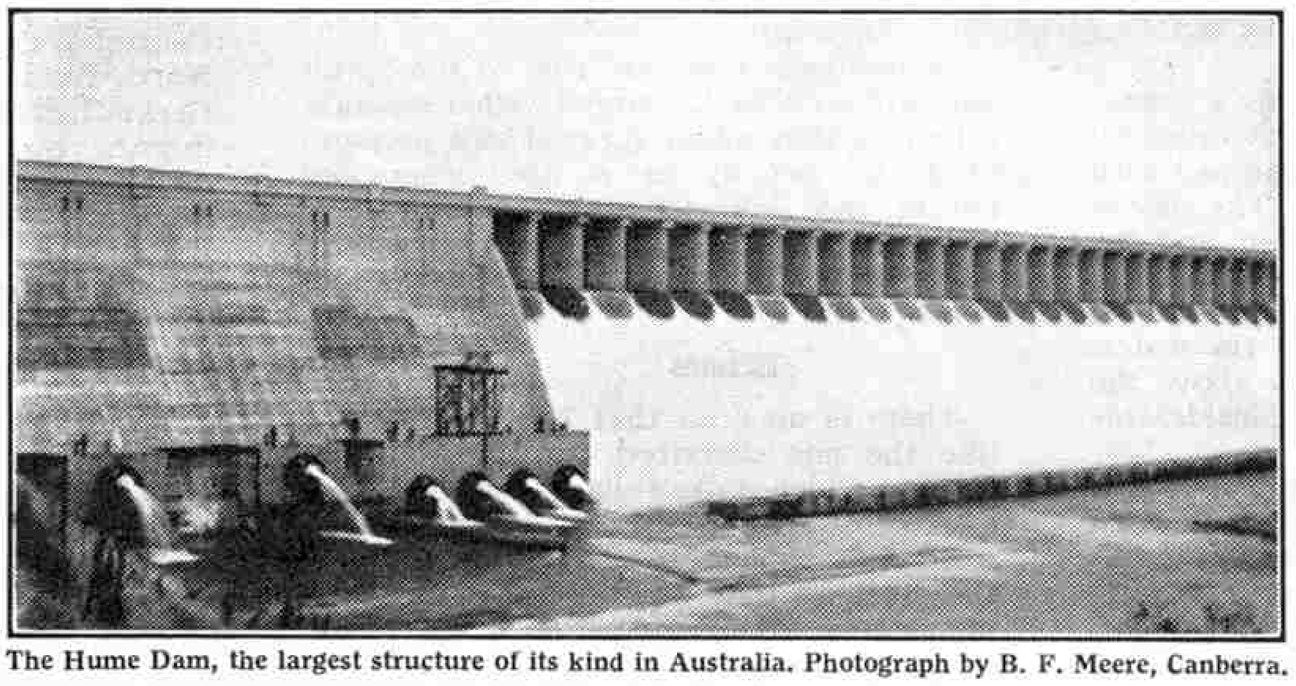
H.M. King Edward VII, then Prince of Wales, firing an early Maxim gun in 1888. Sir Hiram Maxim, the inventor, is seen standing behind King Edward. Illustration by courtesy of "Vickers News."

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy

A Great Australian Dam

The Hume Dam is Australia's largest dam. It is situated on the Murray River, the longest in the country, at its junction with the Mitta Mitta river, several miles from Albury. It is to serve the dual purpose of providing water for irrigation and raising the level of the water in the river to allow it to be used for navigational purposes. So that the depth of the water in the river may be further increased, 17 weirs and locks are in course of construction along the river.

The wall of the Dam is a very massive structure, in which 564,000 cu. yds. of concrete were used. The length of the concrete section is 1,042 ft.; this has a width of 104 ft. at the top of the Dam, on which there is a roadway. The height is 150 ft.



The Hume Dam, the largest structure of its kind in Australia. Photograph by B. F. Meere, Canberra.

The Dam is not completely constructed of concrete, as 4,200,000 cu. yds. of earth also were used. The length of these earthworks is 4,238 ft., and so the total length of the Dam is exactly a mile. The present capacity of the reservoir is 1,250,000 acre-feet. As may be seen in the accompanying photograph, the amount of water running down the stream is regulated by screw sluices. The road over the Dam has improved communication between the States of New South Wales and Victoria, and is becoming increasingly popular with tourists.

The Dam is named after the Australian explorer Hamilton Hume, who with another white man named Hovell discovered the upper waters of the Murray River in 1824.

B. F. MEERE (Canberra).

Making Scenery for Hornby Layouts

Scenery for Hornby layouts can easily be made from cardboard. To go in for too much detail spoils the whole thing, however. It is best to try to get a bold outline. For instance, when making a fence, as shown in the accompanying illustration, the spaces between the bars should not be cut out. Instead all bars should be underlined in black.

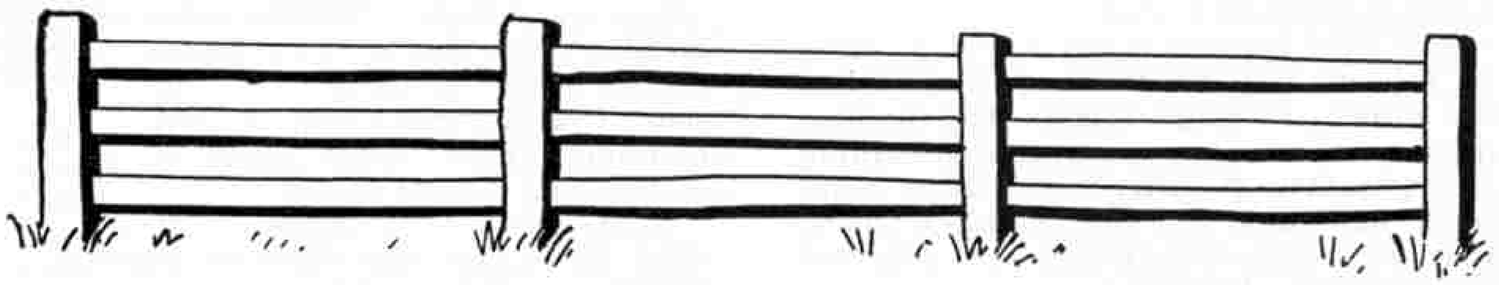
An item that gives a welcome splash of colour to the layout is a tree added to the fence. Trees and hedges can be made out of almost any pieces of cardboard.

Now comes the question of painting. The best paint to use is "Poster" paint. This will cover rough cardboard and can be obtained in small pots. If it is not available, Reeve's paints make good substitutes. If the card has a shiny surface the paint should be put on fairly thickly or it will run off.

An interesting viaduct can be made from a shoe box by cutting out the ends and drawing the design on each side. The viaduct is then cut out and painted.

To make bases for hedges, fences and trees, small pieces of wood about one inch square and half an inch high have slots cut in them. The scenery can then be glued into the bases so as to stand upright.

H. MARSH (Totley).



An example of cardboard scenery for model railway layouts. The spaces between the bars are not cut out; instead bars are underlined heavily.

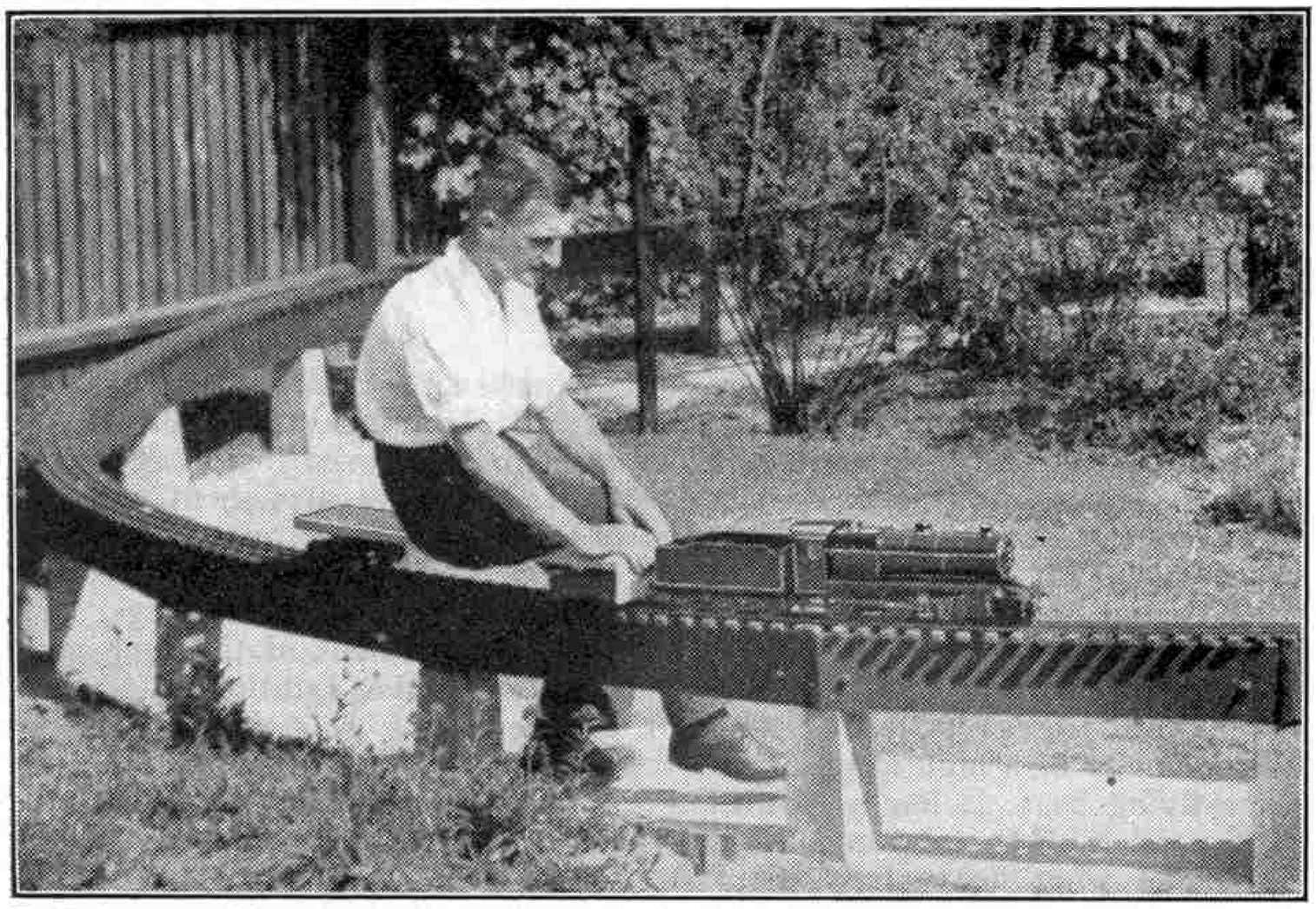
On a Mushroom Farm

One fine morning last summer my brother and I decided to visit a mushroom factory at Wethersfield, a small village in Essex. There are two concrete roads dividing the sheds and the main buildings, and at the end of one of them is a tank from which the whole of the premises are supplied with water. Next to this is another shed where four dynamos are constantly at work, for it is their duty to supply light and heat for the sheds in which the mushrooms are grown. Heating is a very tricky business, as the mushrooms have to be kept at a constant temperature.

We then passed into sheds where we saw the mushrooms at various stages of their growth, some young and some advanced. The soil has to be kept at a certain degree of hardness, for if it were allowed to become too hard the mushrooms would die, or would not come up at all, while if the soil were too soft very poor crops would result.

The ripe mushrooms are collected daily, and trucked to the main buildings, where they are sorted thoroughly, carefully weighed, and packed in baskets and boxes. After this they are transported to the outside world, where they find a ready market. We left the farm greatly impressed by the mushroom growing industry, which yields its products all the year round.

R. D. BARRETT LEONARD (Braintree).



Mr. R. H. Procter, Finchley, seated on a platform truck behind his 2-6-0 steam locomotive on his garden railway. Mr. Procter constructed the engine and tender himself. Photograph by L. F. Bishop, Birmingham.

A Fine Garden Railway

Other readers of the "*M.M.*" will be as interested as I was in the garden railway of Mr. R. H. Procter of Finchley, London N.12. On this railway, which has a circular track of $2\frac{1}{2}$ in. gauge and is 24 ft. in diameter, Mr. Procter runs a working steam model of a 2–6–0 type of locomotive. The engine is capable of pulling two adults on its platform truck, and in the accompanying photograph Mr. Procter is seen in readiness to begin a trip. This illustration gives some idea of the manner in which the track is constructed and mounted, and also shows the pleasant surroundings of this garden railway.

With the exception of the wheels, which were bought as rough castings and finished off on a lathe, every part of the engine and tender was made by Mr. Procter himself from stock metal. Their overall length is 2 ft. 6 in. Small pieces of coal carried in the tender are used to stoke the boiler, and the steam generated is superheated. All wheels are fully sprung, and there is mechanical lubrication to the cylinders. It is possible to run the model for 20 to 30 min. continuously, after which time it is necessary to pick up water.

This excellent model and track took Mr. Procter two years to build in his spare time. He was helped by his son, who was 10 years of age and proved a keen and capable assistant.

L. F. Bishop (Birmingham).

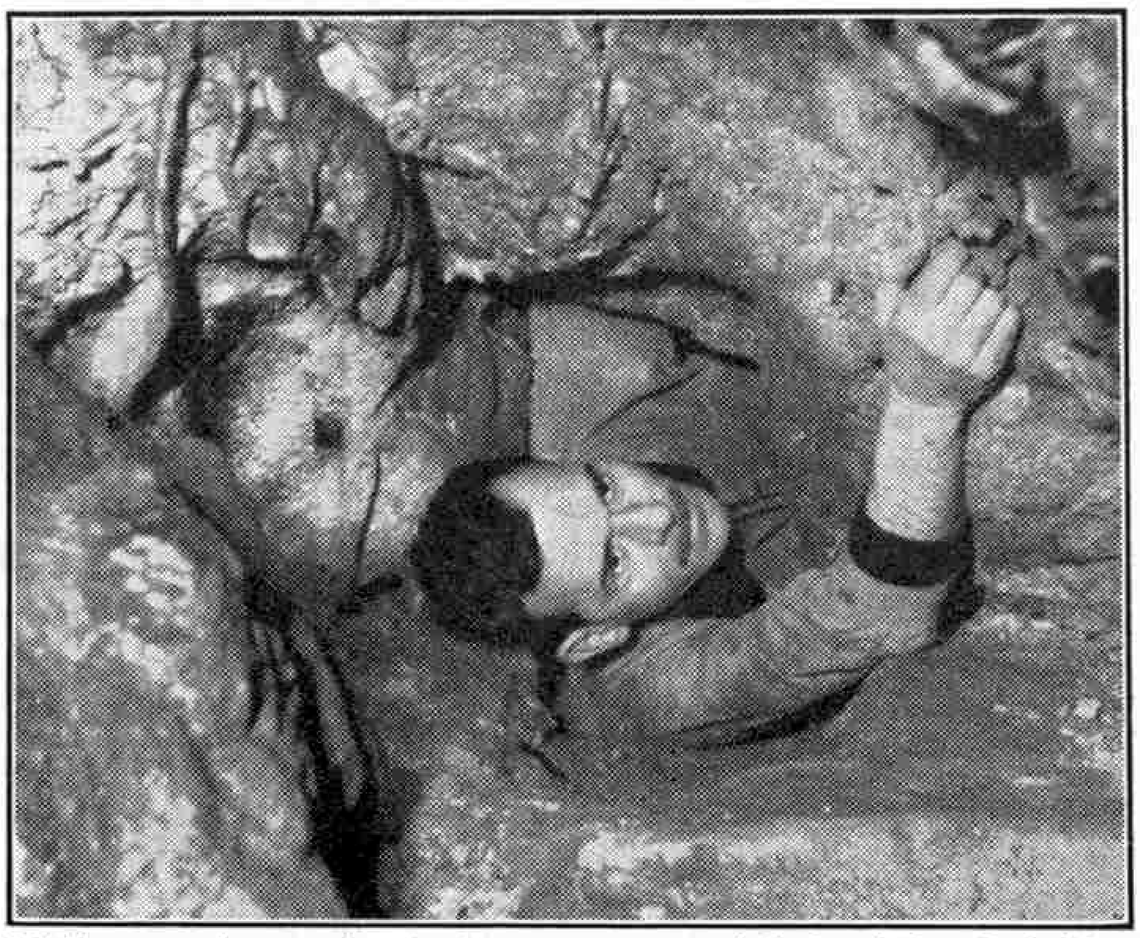
A Tight Squeeze

In the Manifold Valley there are many well-known caves such as Old Hanna's Hole, the Lynx's Cave, and Thor's Cave, the last of which is famous for its size and lofty position in the limestone crags. Lower down the valley is Saint Bertram's Cave, where many valuable Saxon coins and brooches were discovered a few years ago.

I first explored these caves for myself a few months ago with two friends. The cave that I remember most vividly is the Lynx's, so called because the remains of a lynx were unearthed there. It is approached high on a cliff and the entrance leads into a small cavern from which one climbs up a passage. The slope is covered with small stalagmites, which are wet and slippery; and as there is little headroom it is necessary to crawl as best one can up into a large cavern containing many stalagmites and columns.

At first we thought this chamber was the end of the cave, but in a lower corner we found a small passage. We all tried to go through feet first, but it was impossible. I then tried again head first, with one hand stretched out in front, and after struggling for a while managed to get my shoulders in the entrance. It was terribly tight, and the rock seemed to be moulded round my body, making it impossible to see ahead. I struggled along a short distance by pushing against the rock, but it was still very confined. Worst of all, the passage began to slope downward. This made it easier to go down, but I realised that if I could not go through to turn round it would be very difficult to go back up the passage feet first, as I could not push as well with one arm as with two feet, and my clothing would be pushed up over my shoulders and would prevent me from returning.

I had no idea what the passage was like, as it was still impossible to shine a torch; and as I lay panting the echo returned in a dull muffled tone that gave me a terrible feeling in the darkness of being completely stranded. Having got so far I thought I might as well go a little farther, however, and to my relief the passage, which proved to be about 20 ft. long, opened out. Switching on my torch, which I had dragged behind me, I was amazed at the beauty of the lovely cave I had entered, into which few people can ever have penetrated.



A tight squeeze. A cave explorer leaving a narrow passage in the Lynx's Cave, Derbyshire. Photograph by W. Podmore, Loughborough.

After a brief inspection I started up the passage, as I was anxious to know whether I should be able to get out. I found the return much easier than I had anticipated.

W. Podmore (Loughborough).

The "Lerwick" flying boat in the air. Photographs by courtesy of Saunders-Roe Ltd.

Coastal Command Flying Boats

Saro Twin-Engined Types

THE work of the Coastal Command of the Royal Air Force is proving of immense value in the war. In every kind of weather the flying boats of this Command have patrolled the seas, gaining important information, detecting the presence of mines, helping in the safe convoying of merchant shipping, and saving lives and ships on many occasions. The combined hazards of wintry weather and enemy attack failed to interfere with the work of the flying boats or their crews, and millions of miles have been safely flown over stormy sea routes. It is obvious that for such dangerous and exacting work the best available equipment must be provided. In this respect it is interesting to note that the flying boats employed have, in their specifications, much in common with the peace-time types that enabled world-wide air transport to be established.

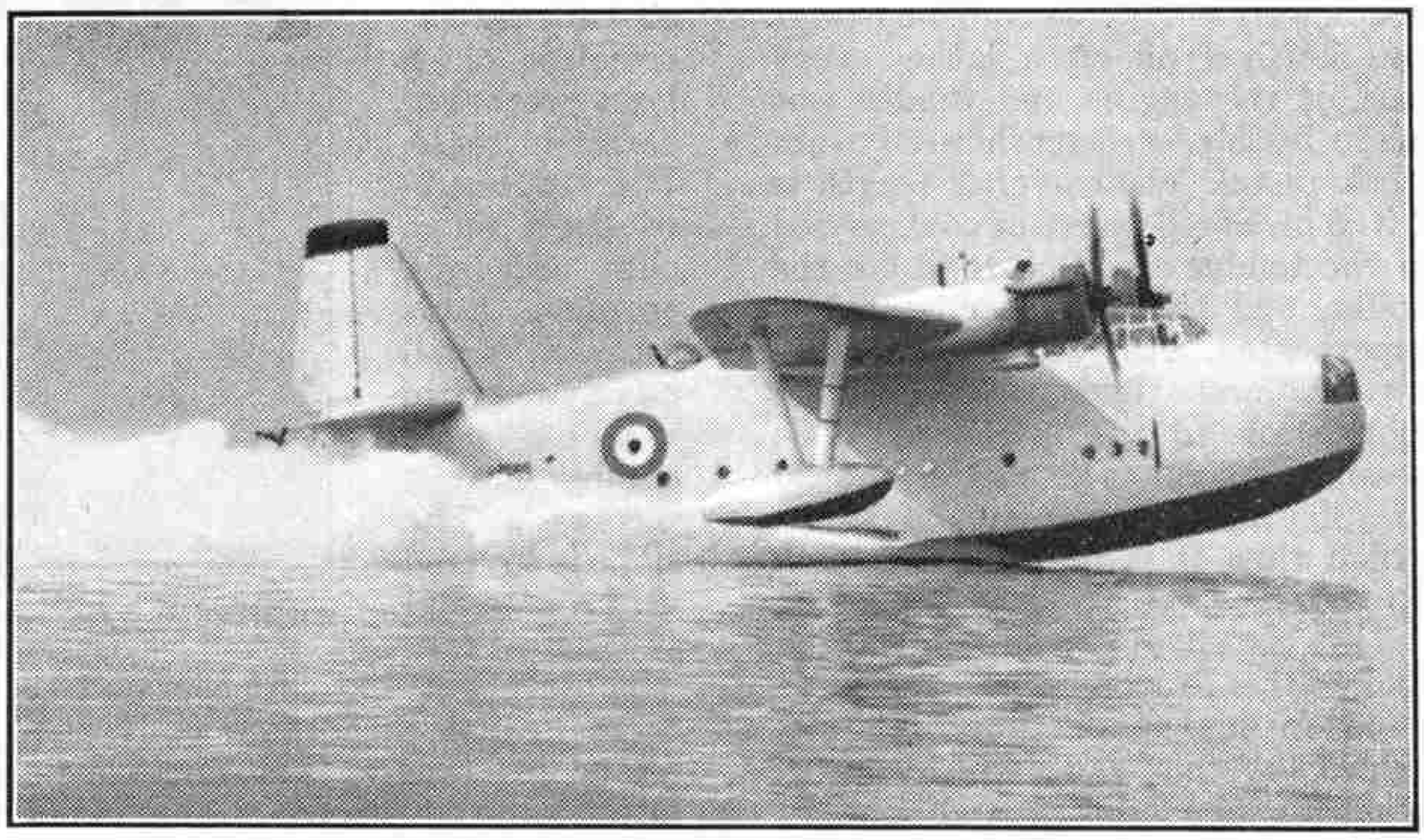
One notable type of flying boat now in service with the Coastal Command is the Saro "Lerwick" shown in the illustrations on this page. This boat is the latest product of Saunders-Roe Ltd., a firm noted both in this country and overseas for the robust construction and good seaworthy qualities of their aircraft. The "Lerwick" is a new type of general-purpose flying boat, and is fitted with two "Bristol" Hercules medium supercharged engines and constant speed airscrews. The range and performance are still secret, but they are known to be considerably in advance of those of other twin-engined flying boats in service, and it can be safely assumed that they are more than sufficient for any task yet known to the Coastal Command pilots. The boat is equipped with three power-operated gun turrets.

The photographs show the "Lerwick" to be a high wing monoplane flying boat. It has a span of 81 ft., and is 63 ft. long and 20 ft. high. The wing float chassis is a departure from normal practice, and each float is mounted on two struts which, while being flexible for shock absorbing, are equal in strength to the more normally braced type.

A previous production in the same "family" of flying boats is the well-known Saro "London" twin-engined open-sea reconnaissance aircraft. This is a biplane type flying boat with the engines mounted in the leading edge of the top plane, a position that gives the airscrews a maximum water clearance. It has a corrosion-resisting hull of Alclad, a specially light metal extensively used in aircraft production, and the superstructure is of dural and stainless steel, with fabric covering.

There is roomy, even luxurious comfort for the crew of six, all of whom sleep on board in bunks of adequate size. It is possible, in fact, to walk about inside the hull without crouching or even bumping one's head. Defensive armament consists of three gunners' stations, one in the extreme bow, another in the extreme stern, and one aft of the wings. The bow compartment of the hull contains the bomber's station in addition to the marine gear. In the nose a hinged door opens forward and upward, giving the bomber-aimer a free view for using his sight. The gunnery positions are cleverly arranged so that there is no "blind spot" that could be exploited by a fleet attacker. Experience has shown, in fact, that when flying low at a moderate speed, the "London's" equipment is sufficient to disconcert the most daring of attackers. A bulkhead with sliding door separates the bow compartment from the pilots' cabin where side-by-side dual control is provided. The two pilots' seats are mounted on raised platforms, with a lower level gangway between them. The controls on the starboard side can be "unshipped" when not in use.

Although its laden weight is nearly 20,000 lb. the Saro "London" can climb at the rate of 1,180 ft. per min. The range at cruising speed is 1,740 miles. It has a stalling speed of 70 m.p.h.



A Saro "Lerwick" taking off for a trial flight. This new type of general-purpose flying boat has three power-operated gun turrets, and is doing good work in the R.A.F. Coastal Command.

A Meccano Fretwork Machine

THE Meccano fret-cutting machine shown in the accompanying illustrations is built entirely from standard parts, and can be used for actual fretcutting.

Each side of the platform 3 consists of two 9½″ Angle Girders bolted together to form a T-section girder. The ends of the platform are also T-section girders, each of them consisting of two 5½″ Angle Girders bolted together. A 5½″ × 2½″ Flat Plate is bolted across each end of the platform, and another similar plate is bolted across the centre, leaving a space of 1″ between each Plate. Three 5½″ × 2½″ Flanged Plates 13 are bolted to the Flat Plates and a 7½″ Girder is bolted to their top flanges.

The work table consists of two 4½″ × 2½″ Flat Plates 15 spaced ½″ apart and strengthened by four 5½″ Angle Girders, the projecting ends of which are joined by a 5½″ Flat Girder that is attached to the flange of the front 5½″ × 2½″ Flanged Plate. The table is supported at the rear by 5½″ Angle Girders, attached by Architraves 14 to the platform 3 and by 1″ Corner Brackets to the sides of the table. At the front the table is supported by two 7½″ Angle Girders.

To build the saw frame support 19, four 18½″ Angle Girders are bolted together to form two 18½″ U-section girders. These are then bolted one above the other to the Flanged Plates 13, and at their rear ends is attached a 7½″ U-section girder 20 consisting of two 7½″ Angle Girders bolted together. The built-up girder 21 consists of two 9½″ Girders and two 3½″ Girders overlapped four holes and bolted together to form an 11″ U-section girder.

Each of the arms 16 and 17 is constructed by bolting two 24½″ Angle Girders together to form a U-section girder. 1½″ Strips are bolted inside the slotted flanges of these girders, and through them are passed 1½″ Rods on which the saw frame pivots.

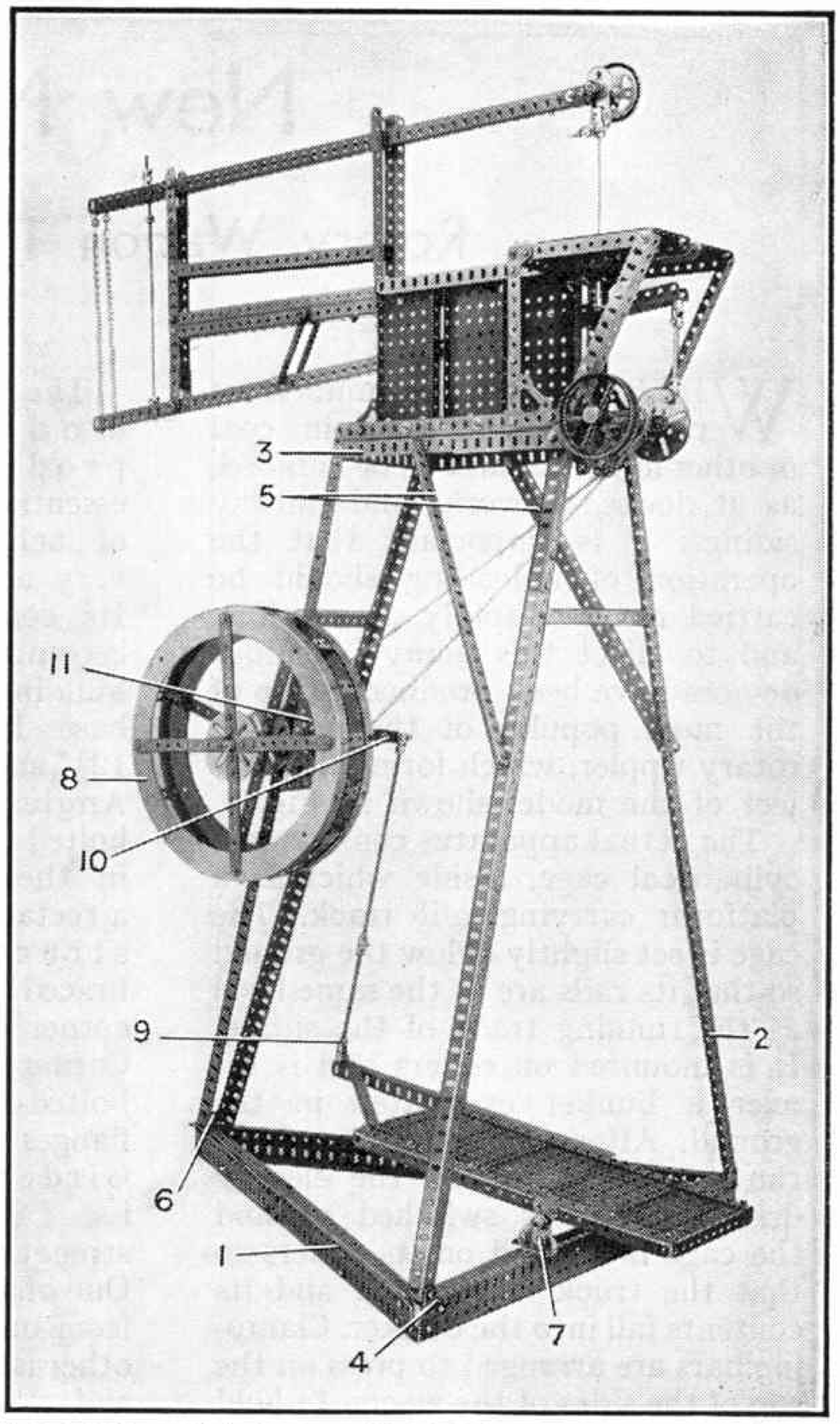


Fig. 1. This model fretwork machine is built entirely from Meccano parts and can be used for actual fretcutting.

The saw frame is tensioned by means of two Compression Springs 23, and the tension applied to the saw can be adjusted by means of a butterfly nut on the Screwed Rod 24. This Screwed Rod is pivotally attached to the lower arm by means of a Swivel Bearing, and the butterfly nut consists of a Threaded Boss fitted with two Threaded Pins. A Collar on the Screwed Rod prevents too much tension being applied to the saw.

The weight of the lower arm is compensated by two Springs 34.

The upper end of the saw blade is held in a Strip Coupling 32 bolted to the arm of a ½″ throw Eccentric 31, which is mounted on a 2″ Rod. The Rod carries a 2″ Pulley and is journalled in two Cranks fixed to the sides of the arm. The saw is held in the Strip Coupling by a 1″ Screwed Rod fitted with a butterfly nut consisting of a Collar and two Threaded Pins. The lower end of the saw is held in a Strip Coupling 33 also fitted with a 1″ Screwed Rod and butterfly nut. In this case the Strip Coupling is bolted to a Trunnion that is attached by its flange to the lower arm.

Reciprocating motion is applied to the saw frame by a crank consisting of a Face Plate 28 mounted on a 4½″ Rod 25. Each of the bearings for the 4½″ Rod consists of a Double Arm Crank bolted to two Architraves 26. In addition to the Face Plate the Rod 25 carries a Flywheel and a 1″ Sprocket Wheel 27. The Face Plate is fitted with a crank pin consisting of a 1″ Rod carrying a Coupling, the Rod being held in place by two Collars. A 2½″ Rod 29 is fixed in the longitudinal bore of the Coupling, and its upper end is held in the spider of a Swivel Bearing fixed to the lower arm of the saw frame. A 2½″ Rod 30 journalled in the Architraves 26, carries a flanged roller guide for the driving chain consisting of two ¾″ Discs and 10 Washers.

The main driving shaft carries the built up flywheel 8, a 3″ Sprocket Wheel and a Crank 10, which consists of two Cranks bolted back to back overlapping 1″. The flywheel comprises two Ring Frames, part No. 167b, joined together by 2″ Strips, and it is weighted with four Weights, part No. 66, bolted inside the rim. The hub of the flywheel consists of Face Plates, and the spokes are 4½″ Strips.

The treadle consists of three 5½″ × 2½″ Flanged Plates and two 5½″ × 2½″ Flat Plates bolted to two 12½″ Angle Girders. It pivots on a 6½″ Rod passed through two 1″ Triangular Plates bolted to its sides and also through two Trunnions 7 attached to the base. A 12½″ Girder is bolted to the right-hand side of the treadle so that it overhangs 11 holes, and its rear end is connected by a Swivel Bearing 9, and an 8″ and a 4″ Rod, to the Crank 10. Connection to the crank is effected by means of a Coupling.

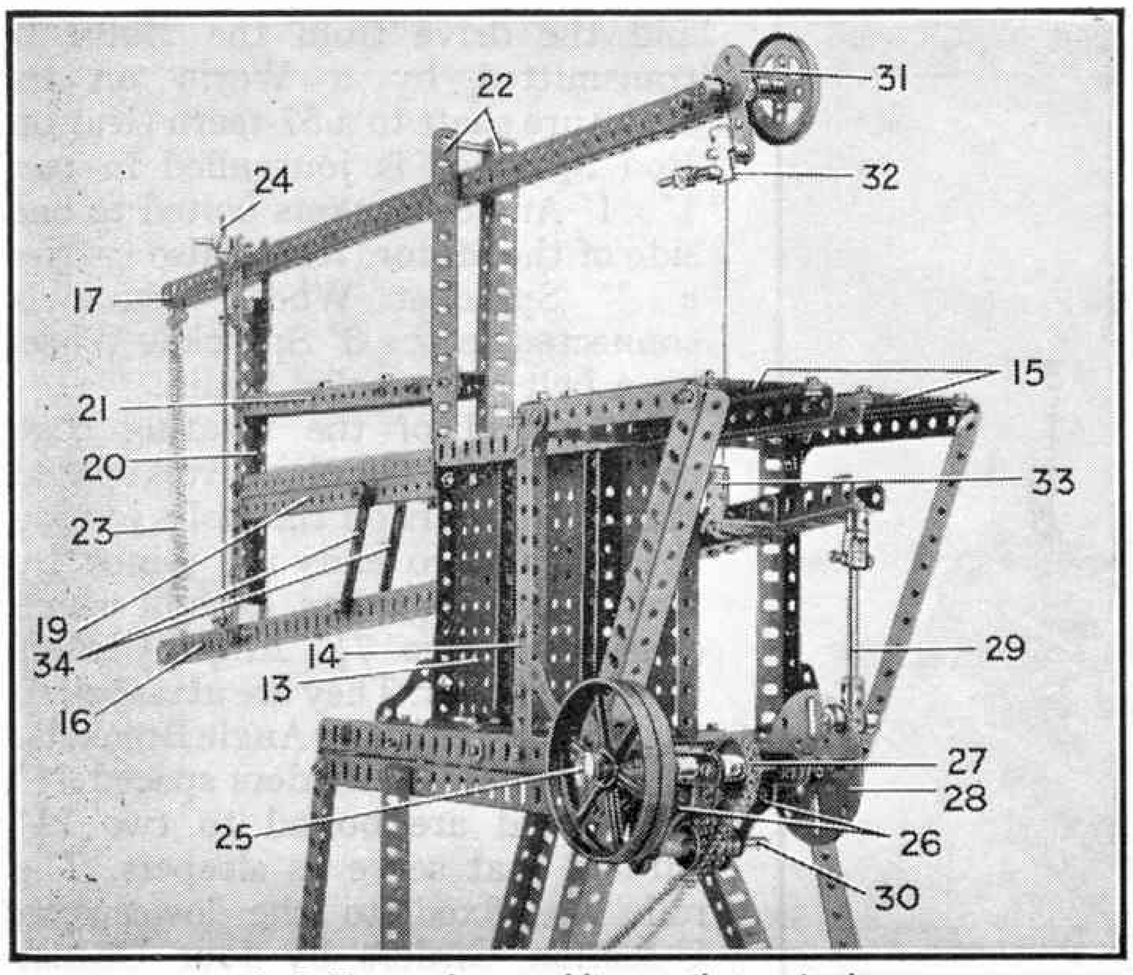


Fig. 2. The saw frame and its operating mechanism.

Parts required to build the fretwork machine: 16 of No. 2a; 4 of No. 5; 16 of No. 6; 2 of No. 6a; 8 of No. 7; 4 of No. 7a; 10 of No. 8; 11 of No. 8a; 11 of No. 8b; 14 of No. 9; 3 of No. 9a; 3 of No. 9b; 3 of No. 9c; 1 of No. 9d; 2 of No. 9e; 1 of No. 9f; 2 of No. 13a; 1 of No. 14; 1 of No. 15a; 1 of No. 15b; 2 of No. 16a; 3 of No. 18a; 1 of No. 20a; 342 of No. 37a; 335 of No. 37b; 215 of No. 38; 4 of No. 43; 6 of No. 52; 4 of No. 53a; 2 of No. 57c; 22 of No. 59; 4 of No. 62; 4 of No. 62b; 4 of No. 63; 2 of No. 63b; 1 of No. 64; 4 of No. 66; 5 of No. 70; 2 of No. 77; 1 of No. 78; 3 of No. 82; 1 of No. 94; 1 of No. 95b; 1 of No. 96; 3 of No. 103b; 2 of No. 103a; 1 of No. 103; 8 of No. 108; 3 of No. 109; 1 of No. 111; 3 of No. 111a; 4 of No. 111d; 6 of No. 115; 3 of No. 126; 1 of No. 132; 4 of No. 133; 8 of No. 133a; 3 of No. 165; 2 of No. 167b; 1 of No. 170 2 of No. 217b.

New Meccano Models

Rotary Wagon Tippler – Crane – Carpet Sweeper

WHEREVER large numbers of railway wagons containing coal or other minerals have to be handled, as at docks, gasworks and railway sidings, it is important that the operation of unloading should be carried out as rapidly as possible, and to effect this many ingenious devices have been produced. One of the most popular of these is the rotary tippler, which forms the subject of the model shown in Fig. 1.

The actual apparatus consists of a cylindrical cage, inside which is a platform carrying rail track. The cage is set slightly below the ground so that its rails are at the same level as the running track of the siding. It is mounted on rollers and is set over a bunker excavated in the ground. After the wagon has been run on to the tippler, the electric driving motor is switched on and the cage is rotated on its rollers so that the truck is inverted and its contents fall into the bunker. Clamping bars are arranged to press on the top of the sides of the wagon to hold it securely while it is being inverted and discharged.

The Meccano model reproduces the essential features of such a tippler very accurately. Its construction is commenced by building up the base from two $12\frac{1}{2}''$ and two $9\frac{1}{2}''$ Angle Girders bolted together in the form of a rectangle. This structure is braced at each corner by a $1\frac{1}{2}''$ Corner Bracket bolted under the flanges of the Girders, and is further strengthened by two $9\frac{1}{2}''$ Girders. One of these is bolted in position $5\frac{1}{2}''$ from one end of the frame, and the other is bolted $2\frac{1}{2}''$ from the opposite end.

Four Architraves bolted to the $12\frac{1}{2}''$ Angle Girders provide bearings for two $11\frac{1}{2}''$ Rods 1 and 2, and are retained in their bearings by Collars, which are spaced 5″ apart. Each of these Rods carries at one end a 1″ Pulley, and at the other end a 1″ Pulley and a 1″ Sprocket Wheel. The Rod 2 also carries a 3″ Sprocket Wheel. The 1″ Sprocket Wheels are connected by a belt of Sprocket Chain.

An E6 or an E20B Electric Motor is bolted by its flanges to the two $9\frac{1}{2}''$ Angle Girders at one end of the base, and the drive from the Motor is transmitted by a Worm on its armature shaft to a 57-teeth Gear on Rod 3, which is journalled in two $1'' \times 1''$ Angle Brackets bolted to one side of the Motor. Rod 3 also carries a $\frac{3}{4}''$ Sprocket Wheel, which is connected to the 3″ Sprocket Wheel by a belt of Sprocket Chain.

Each end of the rotating cage consists of two Circular Strips spaced apart by Collars on the Bolts joining them. The two ends are joined by five U-section girders, each of which consists of two $7\frac{1}{2}''$ Angle Girders bolted together. They are attached to the Circular Strips by Angle Brackets. The rails are $7\frac{1}{2}''$ Girders spaced $1\frac{1}{4}''$ apart, and are bolted to two $2\frac{1}{2}''$ Girders that serve as sleepers. The rails are fixed to the lower two U-section Girders by four Obtuse Angle Brackets.

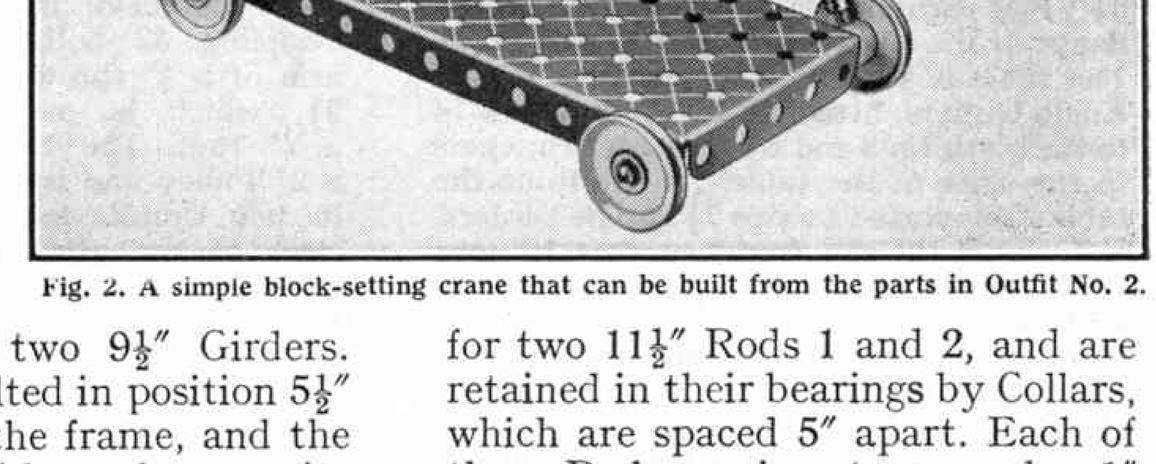


Fig. 2. A simple block-setting crane that can be built from the parts in Outfit No. 2.

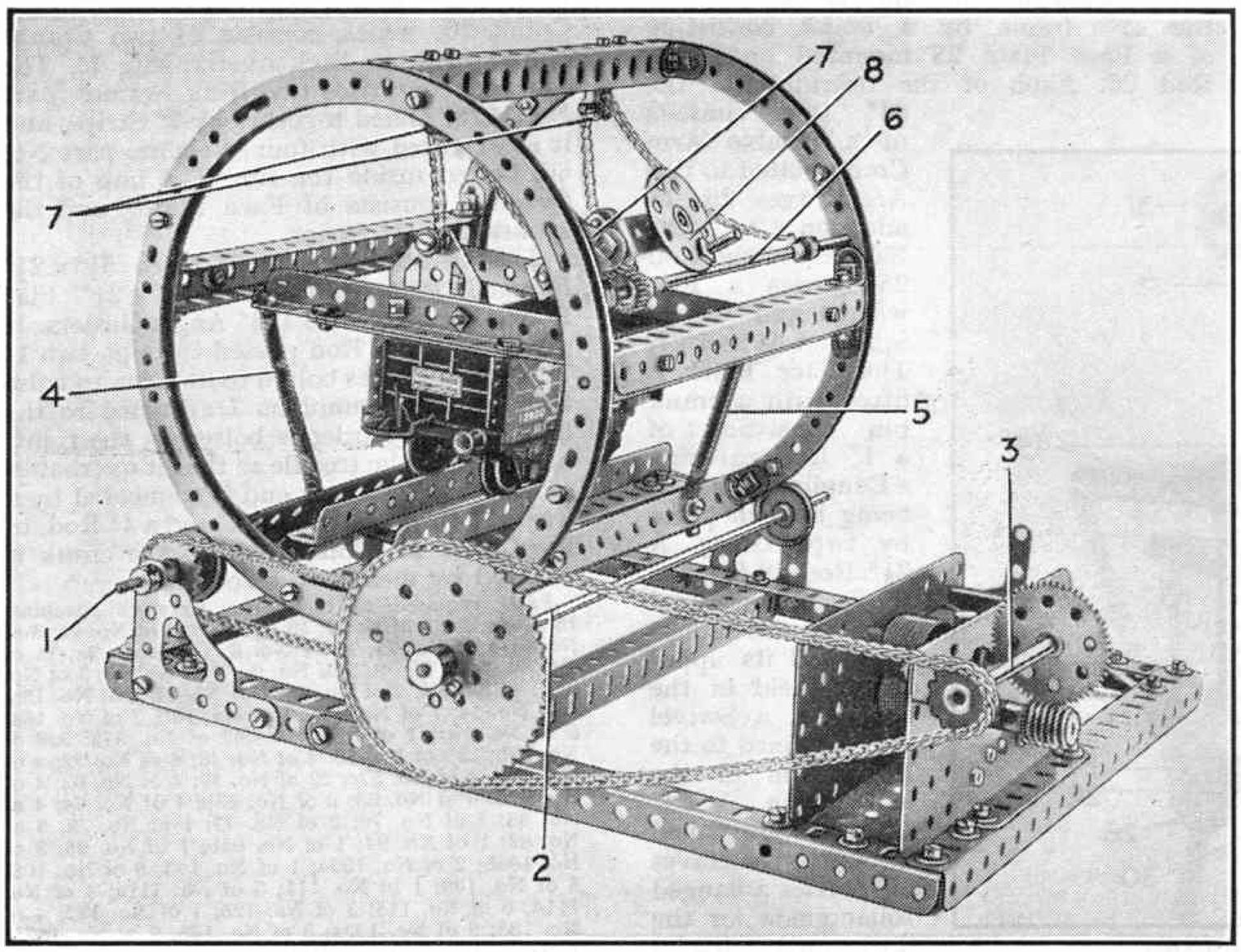


Fig. 1. A Meccano model of a rotary wagon tippler suitable for use with Hornby railway trucks.

When a truck is being tipped it is held firmly in place by two spring loaded clamps, each of which is formed by a $5\frac{1}{2}''$ Angle Girder that has two $3\frac{1}{2}''$ Strips bolted to its slotted flange. A Flat Trunnion is bolted at the centre of the other flange of each Angle Girder. One end of each of the Compression Springs 4 and 5 is bolted to the ends of the $5\frac{1}{2}''$ Angle Girders and their other ends to the lower two U-section girders of the cage.

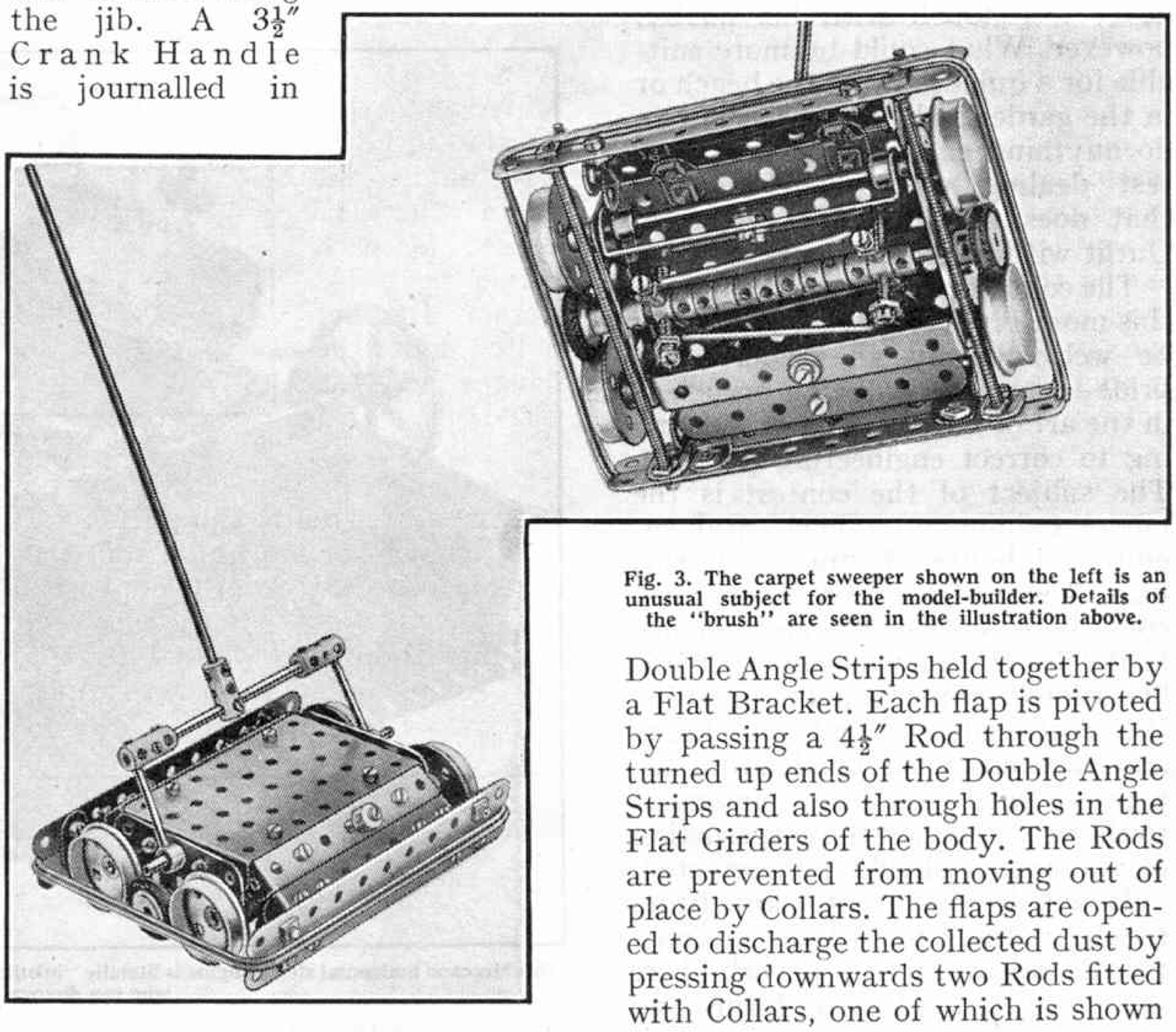
The clamping bars can be applied or withdrawn by turning a handwheel 8. The 8″ Rod 6 carries a $\frac{1}{2}''$ Pinion and two Cord Anchoring Springs, and is prevented from moving endways by means of Collars. To each Flat Trunnion of the clamping bars a piece of Sprocket Chain is bolted, and the Chains are then passed over rollers, each of which consists of a Collar held on a 1″ Rod in the arms of a small Fork Piece 7. The free ends of the Chains are then attached to the Cord Anchoring Springs on the Rod 6. The small Fork Pieces are fixed to the top U-section girder by $\frac{1}{2}''$ Bolts, the shanks of the Bolts being held by the Grub Screws of the small Fork Pieces.

The $\frac{1}{2}''$ Pinion on Rod 6 engages a Worm fixed on a 2″ Rod that is journalled in bearings consisting of two $1'' \times 1''$ Angle Brackets strengthened by a $1\frac{1}{2}''$ Strip. The Worm is spaced from the side of the bearing by a Collar. This unit is bolted to one of the Circular Strips by a $\frac{3}{8}''$ Bolt, and is prevented from swivelling on the Bolt by a 1″ Corner Bracket 7, which is held by the $\frac{3}{8}''$ Bolt and is also bolted to the Circular Strip and to the bearing. The 2″ Rod is fitted with a handwheel formed from a Bush Wheel and a Threaded Pin.

Parts required to build model wagon tippler: 4 of No. 3; 1 of No. 6a; 2 of No. 8; 4 of No. 8a; 12 of No. 8b; 2 of No. 9; 2 of No. 9d; 16 of No. 12; 4 of No. 12a; 4 of No. 12c; 2 of No. 13; 1 of No. 13a; 1 of No. 15b; 4 of No. 22; 1 of No. 24; 1 of No. 26; 1 of No. 27a; 2 of No. 32; 112 of No. 37a; 112 of No. 37b; 70 of No. 38; 4 of No. 43; 18 of No. 59; 2 lengths of No. 94; 1 of No. 95b; 2 of No. 96; 1 of No. 96a; 4 of No. 108; 12 of No. 111a; 1 of No. 111c; 2 of No. 116a; 2 of No. 126a; 4 of No. 133; 1 of No. 133a; 4 of No. 145; 2 of No. 176; E6 or E206 Electric Motor.

The simple block-setting crane shown in Fig. 2 can be built from the parts in Outfit No. 2. Construction should be commenced by bolting two $5\frac{1}{2}''$ Strips together overlapping three holes, to form one side of the jib, and repeating this to form the other side. The sides are held apart at each end by Flat Trunnions attached to Angle Brackets, and near the centre by a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bent to shape. The bolts that hold the Flexible Plate also hold two $2\frac{1}{2}''$ Strips, two $2\frac{1}{2}''$ Cranked Curved Strips and a built-up Double Angle Strip composed of two Flat Brackets and two Angle Brackets. Another $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate is bent to form the lower portion of the tower. It is strengthened by a Bush Wheel, and the lower parts of the Strips are bolted to it. The crane is pivotally mounted by passing a $\frac{3}{8}''$ Bolt through the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate and gripping this in the boss of the Bush Wheel.

The travelling carriage consists of two Trunnions bolted together. 2″ Rods are journalled in opposite holes of this carriage and held in place by Spring Clips. The carriage is free to slide along the jib. A $3\frac{1}{2}''$ Crank Handle is journalled in opposite holes in the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate. The Cord is passed several times around it and then over the compound Double Angle Strip. One end of it is then tied to one of the Rods, and the other end is passed through the Angle Bracket bolted to the Flat Trunnion and tied to the second Rod of the carriage. A piece of Cord tied to the Bolt that holds the Angle Bracket is passed over the nearest Rod on the carriage, and is then tied to a Small Loaded Hook.



Parts required to build the model block-setting crane: 4 of No. 2; 2 of No. 5; 2 of No. 10; 7 of No. 12; 2 of No. 16; 2 of No. 17; 1 of No. 19g; 1 of No. 22; 2 of No. 24; 4 of No. 35; 25 of No. 37a; 25 of No. 37b; 1 of No. 40; 1 of No. 52; 1 of No. 57c; 2 of No. 90a; 1 of No. 111; 2 of No. 126; 2 of No. 126a; 2 of No. 189.

Fig. 3 shows two views of an interesting model carpet sweeper, the construction of which provides a pleasant change from the more usual kind of model-building. The body of the model is formed by bolting a $2\frac{1}{2}''$ Flat Girder to each flange of a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, the sloping front and back consisting of two $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips held together by two Flat Brackets and attached to the body by two Obtuse Angle Brackets. Two $4\frac{1}{2}''$ Strips held together by two Flat Brackets represent guards. The ends are held together by two $4\frac{1}{2}''$ Screwed Rods.

Dust collected by the revolving brush is thrown on to two hinged flaps consisting of two $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips held together by a Flat Bracket. Each flap is pivoted by passing a $4\frac{1}{2}''$ Rod through the turned up ends of the Double Angle Strips and also through holes in the Flat Girders of the body. The Rods are prevented from moving out of place by Collars. The flaps are opened to discharge the collected dust by pressing downwards two Rods fitted with Collars, one of which is shown in Fig. 3.

Fig. 3. The carpet sweeper shown on the left is an unusual subject for the model-builder. Details of the "brush" are seen in the illustration above.

To make the "brush" two spiders from Swivel Bearings are placed on a $4\frac{1}{2}''$ Rod and are spaced from each other by nine Collars. A $\frac{3}{4}''$ Bolt is screwed in each threaded hole of the spiders and four lengths of Spring Cord are fixed between opposite pairs of Bolts. The brush is held on the $4\frac{1}{2}''$ Rod by Collars.

The sweeper runs on wheels consisting of $1\frac{1}{8}''$ Flanged Wheels held to the ends of the Rods by their Grub Screws, and the brush is driven from them by means of two $\frac{1}{2}''$ Pulleys fitted with Rubber Rings.

Parts required to build carpet sweeper: 6 of No 3; 10 of No. 10; 8 of No. 12c; 1 of No. 13a; 4 of No. 15a; 1 of No. 16b; 4 of No. 20; 2 of No. 23a; 34 of No. 37a; 26 of No. 27b; 38 of No. 38; 6 of No. 48b; 1 of No. 53; 1 of No. 58; 1 of No. 58a; 17 of No. 59; 3 of No. 63; 2 of No. 80b; 2 of No. 81; 2 of No. 103f; 8 of No. 111.

Prizes for Sharp-Eyed Readers

What is Wrong with this Engine?

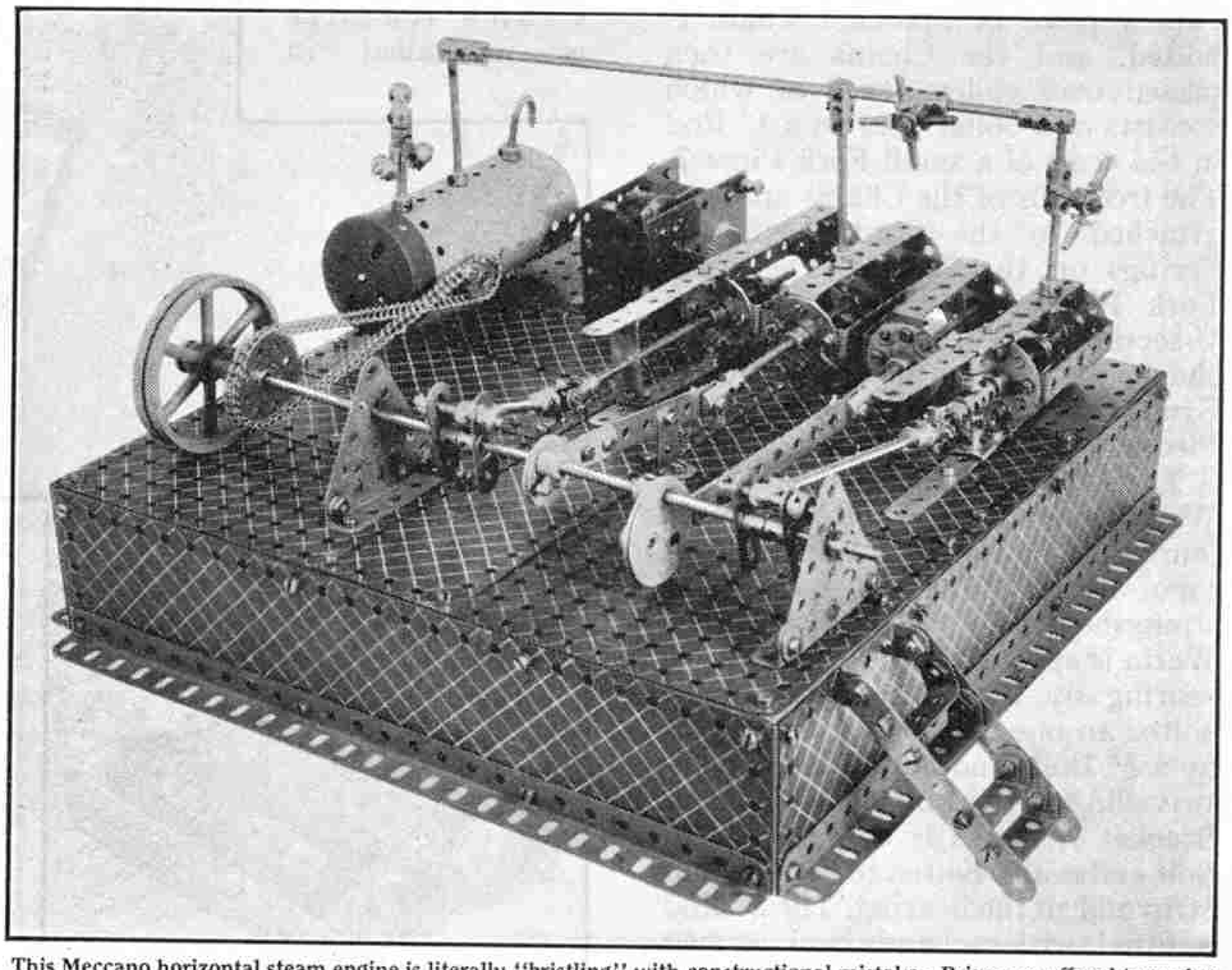
DURING the summer months the majority of Meccano boys are so fully occupied with the outdoor sports and pastimes that the warmer weather affords that they have little time in which to design and complete new models. Even if the Meccano boy spends every minute of his spare time out of doors, he need never lose touch with his hobby, however. What could be more suitable for a quiet hour on the beach or in the garden, when it is too hot to do anything energetic, than a contest dealing with model-building that does not require a Meccano Outfit with which to compete.

The contest that we are organising this month is of this type, and it will be welcomed by all readers who pride themselves on being proficient in the art of building models according to correct engineering practice. The subject of the contest is the model twin-cylinder horizontal engine and boiler illustrated on this page. The model has purposely been constructed incorrectly, and a glance at the illustration will show that it is "bristling" with ridiculous faults. We want readers to find these faults and to send a list of them to us, together with their own opinions as to the way in which the construction of the model should be corrected.

It will be seen that competitors require nothing more than a pen or pencil and a sheet of paper! There are no entrance fees or forms and every reader can enter, since the mistakes are obvious and can be found easily by examining the illustration.

It should be clearly understood that to enter this contest one need not be an expert essayist. Any reader who "spots" most of the errors and sets them down clearly has a very good chance of obtaining one of the principal prizes. Entrants should write down in column form all the errors they can discover, and then state briefly against each item in the list how the error should be corrected. If necessary a small sketch may be shown alongside each item to make the competitor's suggestions clear.

As a help to competitors it may be pointed out that two distinct types of errors were made when the model was constructed. The first type relates to the manner in which the parts have been assembled, which, to say the least, is certainly not in accordance with good Meccano practice! Of course, readers must assume that the builder had the proper parts available when he constructed the model. The second type of error concerns the design of the model. Any reader who is familiar with the elementary principles of a steam engine and boiler will soon "spot" mistakes of this type.



This Meccano horizontal steam engine is literally "bristling" with constructional mistakes. Prizes are offered to readers who can discover the greatest number!

The prizes to be awarded are as follows: 1st, Meccano or Hornby products value £3/3/–; 2nd, products value £2/2/–; 3rd, products value £1/1/–. There also will be five additional prizes of products to the value of 10/6 and 10 others of products value 5/–.

If no competitor succeeds in pointing out every mistake, the First Prize will be awarded to the competitor or competitors who submit the largest lists of errors. If several competitors succeed in pointing out all the mistakes included in the model, the judges will give precedence to those entries that put forward the simplest and most practicable alternative methods of construction.

Entries should be addressed to "*July Errors Contest*," Meccano Ltd., Binns Road, Liverpool 13, and competitors should take particular care to see that their name, age and address appear on the back of each sheet of paper submitted. Entries must be posted in time to reach Liverpool not later than 31st August.

Successful competitors will be notified by letter as soon as possible after the closing date, and a full account of the results of the Contest together with a complete list of prize-winners will be published later in the "*M.M.*"

Readers will find that "spotting the mistakes" is really good fun quite apart from the chance of winning a valuable prize that will be ample reward for the small effort involved in preparing and submitting an entry.

Model-Building Competition Results

By "Spanner"

"New Year" Contest

This competition was announced in the January issue of the *"M.M.,"* in the midst of the winter model-building season, and among the competitors were many who were taking part in a Meccano Competition for the first time. Some of these commenced the Meccano hobby only last Christmas, and I was very pleased to find that several had managed to secure a place among the prize-winners.

Another feature of this competition was the similarity of subjects chosen by the competitors who won the First, Second and several of the smaller prizes in Section A. Each of these competitors submitted a crane, and some of their models were very fine examples.

The complete list of successful competitors is as follows:

Section A (competitors aged 15 and over).

1st Prize, Cheque for £3/3/–: C. Howard Pendlebury, Hinckley. 2nd, Meccano or Hornby products value £2/2/–: N. Ta'Bois, Woodford Green. 3rd, products value £1/1/–: F. G. Rich, Orpington.

Products value 10/6: G. Weeks, Torquay; F. Robertson, Falkirk; E. Clements, Orpington; E. Collins, Leeds; J. Goodrum, Lanchester; E. Labbett, Sutton; E. Barlow, Cheadle Hulme; A. Webster, Edinburgh; G. C. Corleo, Malta; C. Elsdon, Norfolk.

Products value 5/–: V. Axisa, Malta; W. Stainer, Bournemouth; J. Rolfe, Ruabon; T. Green, Stockport; J. Whitehouse, Dawlish; L. Weedon, London W.14; J. Smulovitch, London E.4; P. Wickham, Leicester; W. Houghton, Daventry; G. Pusey, Southampton.

Section B (competitors under 15).

1st Prize, Cheque for £3/3/–: G. Bland, Monk Bretton, Yorks. 2nd, Meccano or Hornby products value £2/2/–: W. Kirby, Haslingden. 3rd, Products value £1/1/–: M. Alden, Stapleford Tawney, Nr. Romford.

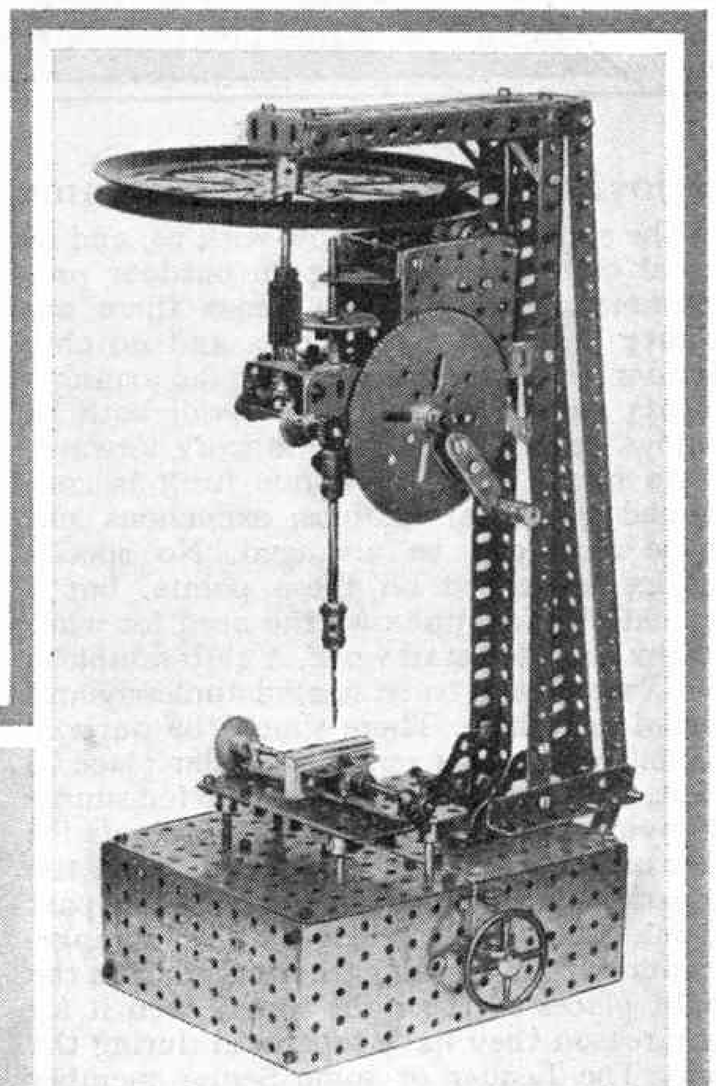
Products value 10/6: T. Simpson, Bishop Auckland; J. Chalmers, Glasgow E.2; R. Lowe, Sheffield; E. Henry, Cardiff; J. Whipp, Burnley; J. Goyder, Shipley; M. Gainsborough-Waring, London; J. Fearne, Malta; G. Freeman, Connah's Quay; H. Bird, Gt. Yarmouth.

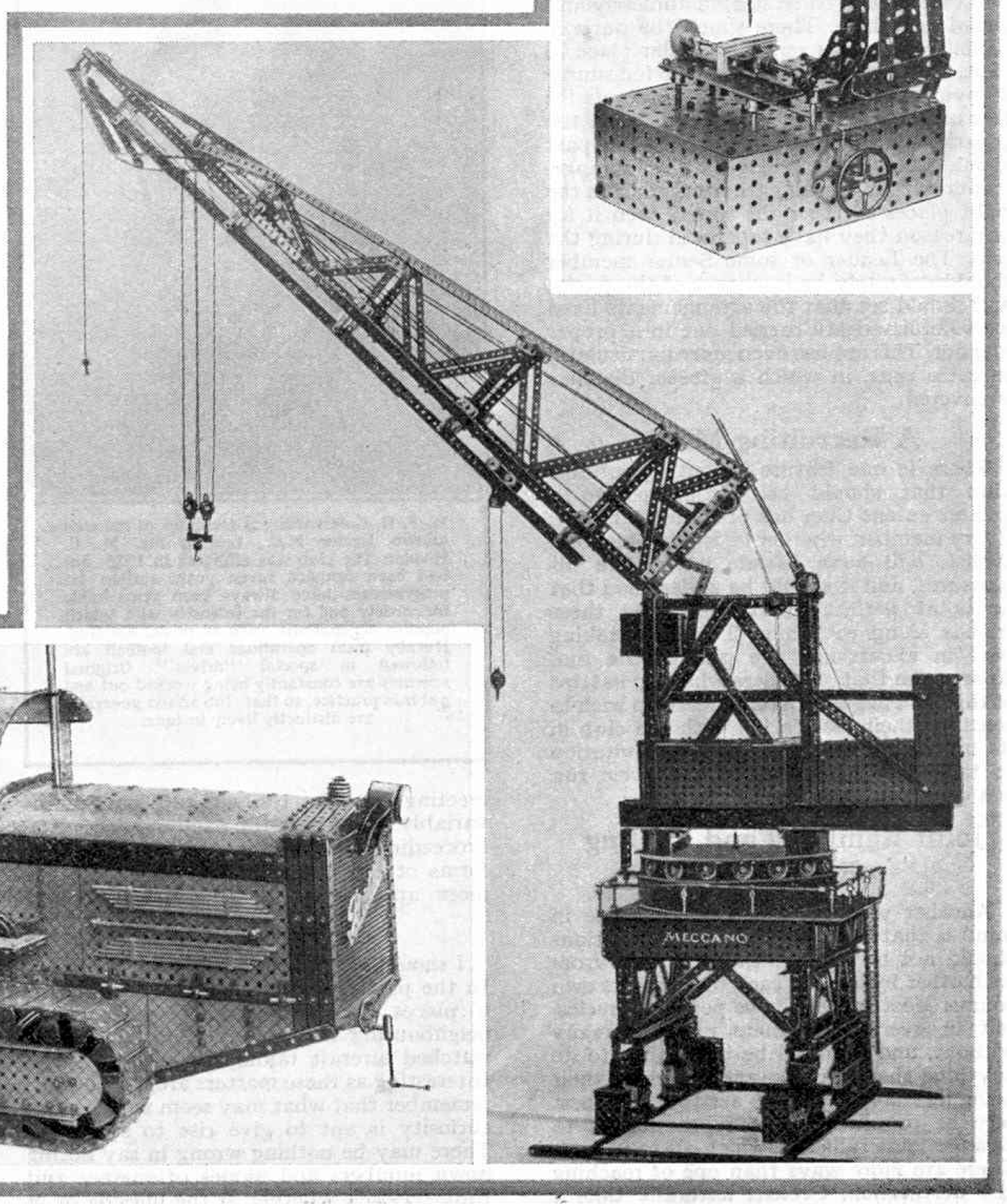
Products value 5/–: L. Kemp, Bradford; G. Myburgh Claremont, S. Africa; R. Knowles, Douglas; E. Barker, Eastbourne; C. Ross, Glasgow W.1; Miss M. J. Parker, Chesterfield; R. Naisbitt, E. Herrington; L. Furmedge, Basingstoke; W. Hodges, Bucknell; A. Carter, Melbourne, Australia.

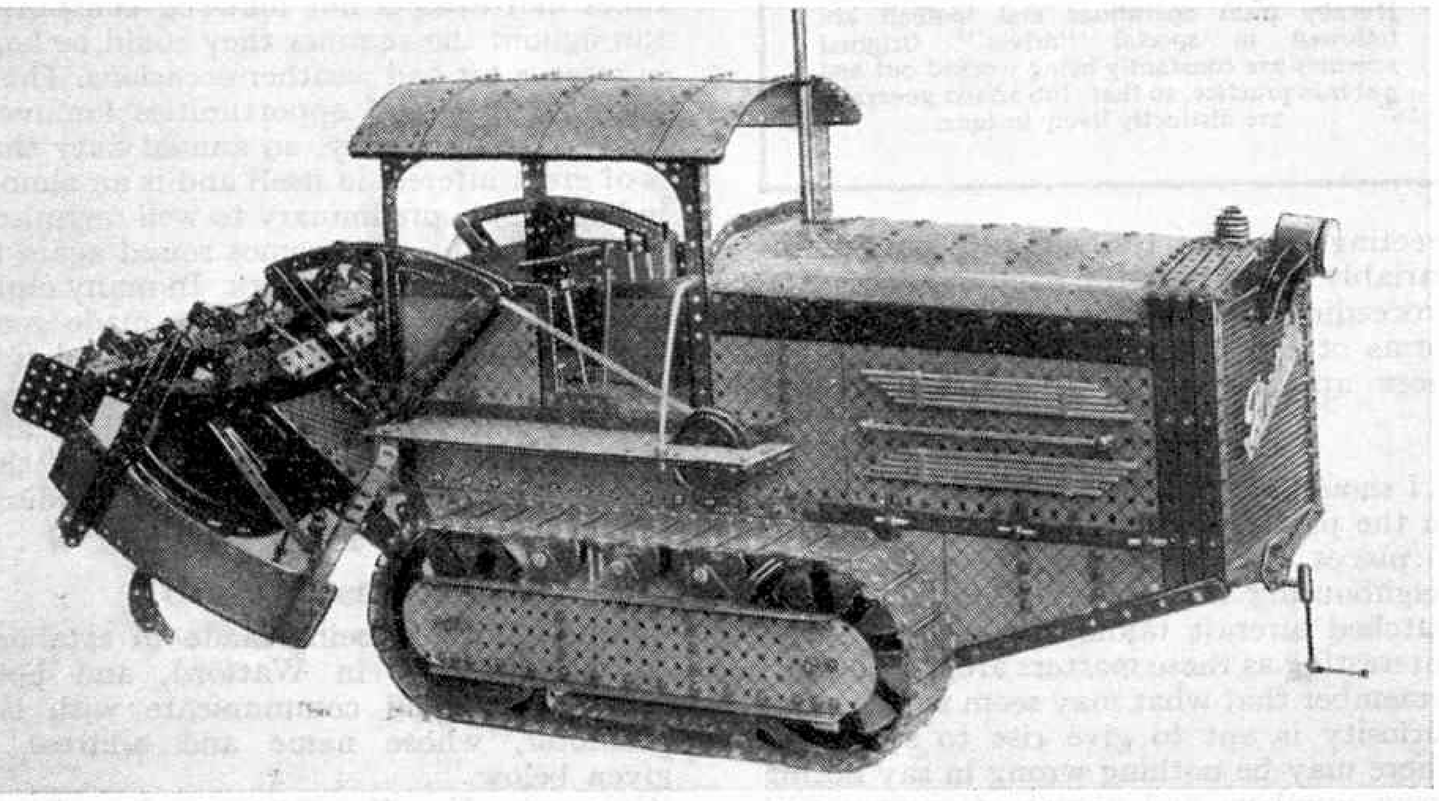
I have already mentioned that the First and Second Prizes in Section A were awarded for two fine model cranes. One of these, that built by C. Howard Pendlebury, Hinckley, is illustrated on this page and although it is a really excellent model the judges found it very difficult to decide whether it were more worthy of First Prize than the crane built by N. C. Ta'Bois, Woodford Green. Several little refinements in its construction, however, finally swayed the judges in its favour. This model is a close reproduction to scale of a 50-ton portable crane in service at the King George V graving dock, Southampton, and it is based on details and photographs supplied by Stothert and Pitt, Bath, the builders of the actual crane. The model will easily lift a load of from 25 to 30 lb., and is ballasted with 20 lb. of lead housed at the rear of the base. All the motions of the crane are operated by a 20-volt Motor, and are controlled from a series of levers housed in the cab.

N. C. Ta'Bois' model is a giant structure. It is six feet high and weighs nearly 45 lb., and incorporates all the features of a powerful level-luffing dockside crane. A novel feature is that each motion is operated by an Elektron Magnet.

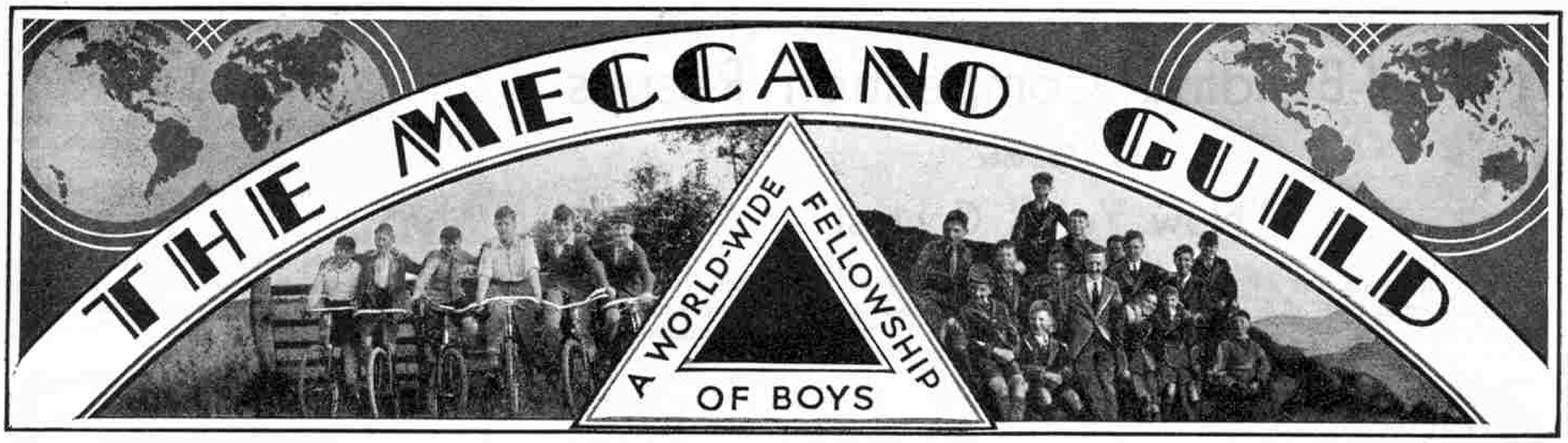
Third Prize in Section A went to F. G. Rich, Orpington, who built the gyrotiller shown at the foot of this page. The model is fitted with two Electric Motors, one of which drives the creeper tracks, while the other drives the two rotary tillers.







Three fine models that won prizes in the "New Year" Contest. At the right is a crane built by C. Howard Pendlebury, Hinckley, and below is seen a gyrotiller designed by F. G. Rich, Orpington. G. C. Corleo, St. Julians, Malta, built the drilling machine shown in the top right illustration.



Enjoying the Summer Programme

The summer term is now with us, and as usual clubs are following an outdoor programme. Even in these times there are plenty of things to be done, and no club Leader need be at a loss to make arrangements for a programme that will both be enjoyable and will help club work forward.

As far as the programme itself is concerned the usual rambles, excursions and cycle runs can be arranged. No special advice is needed on these points, but I should like to emphasise the need for what might be called staff work. A club ramble is not a mere walk to be started aimlessly and ended anywhere. There should be purpose behind it, such as some particular place to visit, whether one of interest or for simple enjoyment. Refreshments and intervals for rest or games should be allowed for in the programme, and every member taking part should have full knowledge of these arrangements so that all can gather together in the right places at the right times, even if for any reason they have separated during the trip. The Leader or some Senior member should definitely be in charge of the party, and should see that the arrangements fixed up beforehand are carried out in a proper manner. This applies even more particularly to cycle runs, in which a greater distance is covered.

A Recruiting Move

There is one feature of outings of this kind that should be encouraged to a greater extent than has prevailed hitherto. Every member, whether he is a rambler or a cyclist, will have friends who share his pleasures, and it should be understood that he is at perfect liberty to bring these friends along with him. The more taking part in excursions, the greater the fun. Apart from that, outsiders who join in trips of this kind are very likely indeed to wish to continue their association with the club in its indoor activities, so that an invitation to take part in a ramble or a cycle run is a good recruiting move.

Joint Rambling and Cycling Excursions

Another point that should be borne in mind is that rambling and cycling sections should not be made entirely distinct from each other by leaving each to follow its own course. Most modern boys possess bicycles, but in every club there may be many without, and it would be bad policy to do anything that would suggest to them their being left out of full club activity. The best way of preventing this separation is to arrange joint rallies in which all take part. There are more ways than one of reaching any destination. Cyclists naturally take a longer route, and on joint excursions walkers could either take short cuts, or even travel part of the way by bus or train. Good staff work is especially important for trips of this kind, so that neither party shall waste any time waiting for the other. The meeting between the separate parties invariably adds a little excitement to the proceedings, and the tea, games and other forms of fun enjoyed together are all the more appreciated by everybody.

Meccano Club Secretaries
No. 55. M. F. R. Golesworthy

M. F. R. Golesworthy is secretary of the well known Exeter M.C., Leader, Mr. M. C. Hodder. The club was affiliated in 1925, but had been founded seven years earlier. Its programmes have always been remarkable for variety and for the intensity with which popular occupations, such as model-building, Hornby train operations and football are followed in special "drives." Original schemes are constantly being worked out and put into practice, so that club affairs generally are distinctly lively in tone.

A Warning Note

I should like to add one word of warning. In the past clubs have planned excursions to places of railway interest, and even to neighbouring aerodromes, where they have watched aircraft taking off and alighting. Interesting as these matters are, it is best to remember that what may seem to be undue curiosity is apt to give rise to suspicion. There may be nothing wrong in say noting down numbers and names of engines and train services, whether at the lineside or in some famous station. Similarly, keeping track of aircraft or taking photographs near aerodromes or railways may be perfectly harmless. With ideas of Fifth Column activities rightly prevailing, as they are to-day, to follow the usual plan is to ask for trouble, however, and all such activities therefore should be abandoned for the time being.

Club-Room Fun in Summer

While the outdoor programme is being followed club-room work should be kept in mind. It is very unlikely that model-building will be abandoned altogether, and this year in particular, in view of the advisability of leaving out some of the activities to which I have already referred, club-room work probably will be carried on with greater intensity than in previous summers. Proceedings may well be lighter in tone, and I suggest that special attention should be paid to the running of good passenger and goods train services on the Hornby layouts that most clubs own, and which are the central feature of Branch proceedings.

It is great fun also to plan out schemes for special wartime traffic, and the topical nature of these will make them more attractive to members. The transport of miniature guns and other war equipment easily obtainable, or built from Meccano Parts, provides an excellent instance of what can be done, and convoys of Dinky Toys lorries and armoured vehicles could be included in joint road and rail schemes. Members will enjoy this, and will work out special plans for themselves. They should be encouraged to show initiative and enterprise in these exercises in miniature.

Such activities as these are splendid at all times and even if not followed constantly throughout the summer they could be kept in reserve for bad weather occasions. These also offer splendid opportunities for overhaul of club property, an annual duty that is of great interest in itself and is an almost indispensable preliminary to well organised work when the time comes round again to concentrate on indoor work. In many clubs working tables or benches are made good where necessary, storage accommodation for club property of all kinds is extended, and the club room itself is cleaned up and given a cheerful appearance. Work of this kind is excellent, for drab surroundings only encourage depression.

Proposed Club

An attempt is being made to establish a Meccano club in Watford, and boys interested should communicate with the promoter, whose name and address is given below.

WATFORD—K. R. Cooper, 25, Berry Avenue, Watford, Herts.

Wakefield M.C.—Regular model-building competitions are being held, with excellent results. A play written by Mr. G. Gunson, Leader, has been read, and is now being rehearsed and prepared for presentation. An Exhibition also is to be arranged. A special Visit was paid to the Wakefield Art Gallery to see the stamp display there. A hectograph has been made to allow the reproduction of advertising and recruiting literature. Leaflets have already been produced for distribution. Club roll: 11. *Secretary:* K. Ward, 94, Alverthorpe Road, Wakefield.

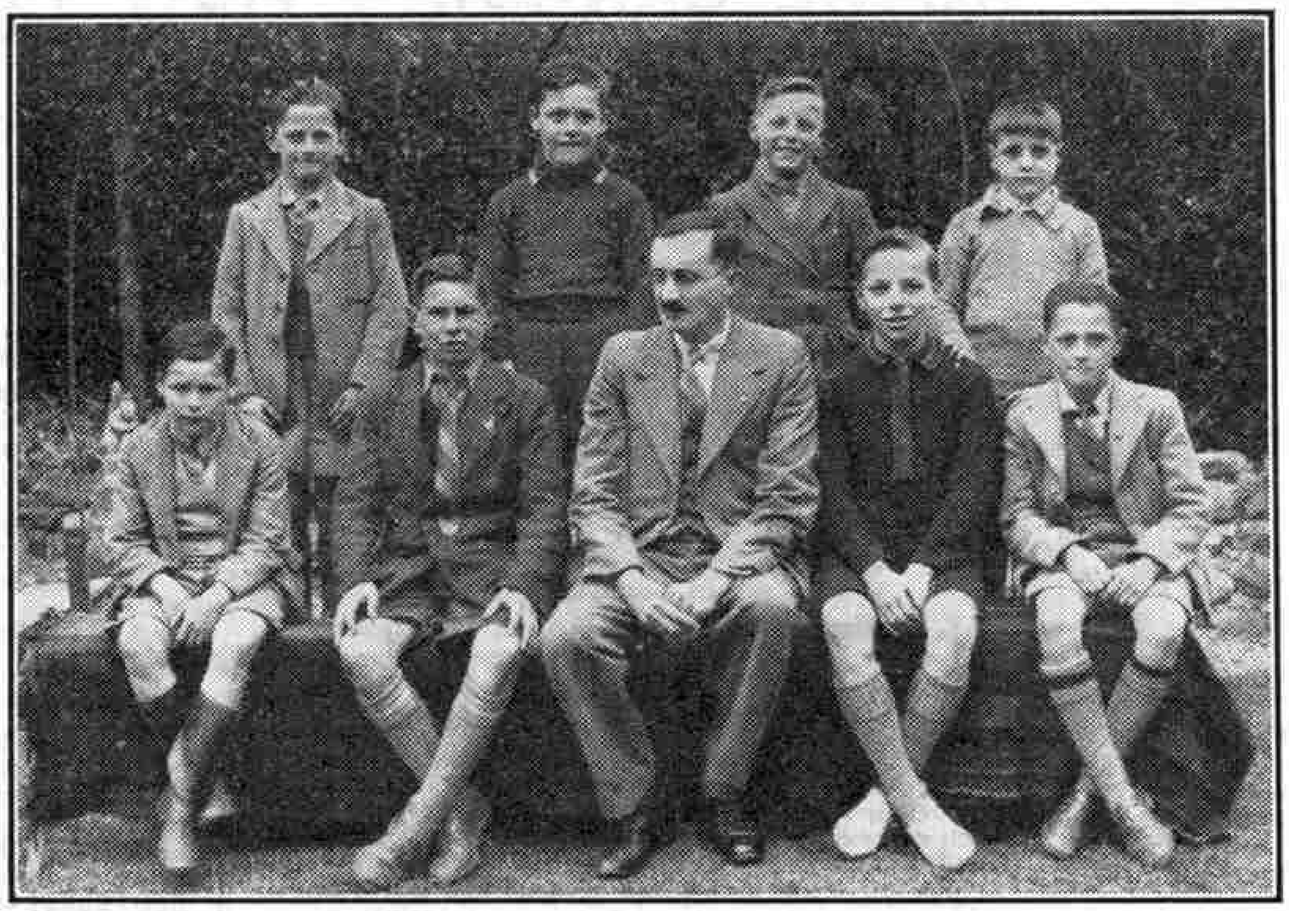
St. James Secondary School (Grimsby) M.C.—Regular meetings have recommenced. A Recruiting Campaign is being undertaken, and new members have already been obtained. Models built include a giant grabline and a luffing crane. The secretary has completed a splendid model coaching inn. Aeroplane models also occupy the attention of members, one of whom has constructed several flying models, while another has produced solid models of the Hawker *"Hurricane."* Club roll: 14. *Secretary:* G. H. Howard, 8, New Haven Terrace, Grimsby.

Blundellsands M.C.—Excellent progress is being made, and many new members have joined. Talks have been given by members on *"Railway Signalling Systems," "Diesel Engines"* and *"Cycling."* A large chest has been bought and fitted up to hold members' Meccano Outfits. Many excellent models were built for the club's Exhibition. This was very successful, and a collection made on behalf of the *"M.M."* Radio Fund realised £1 4s. 4d. Club roll: 24. *Secretary:* J. K. Noel, 24, Lancaster Avenue, Crosby, Liverpool 23.

Folkestone M.C.—The weekly meetings are now held on Saturdays, as full school work has been resumed. The Fretwork Section has been particularly busy, and all members have constructed models for a special display in the club room to be held in July. Club roll: 7. *Secretary:* F. E. Saunders, 79, Dover Road, Folkestone.

Pettits Senior Boys School (Romford) M.C.—Busy times have been experienced, with all members constructing models for display at the Exhibition held this term. At other meetings short Lectures have been given by members, with lantern illustrations. More scientific books have been added to the Library, in which additional magazines on topics of interest to members are now included. Club roll: 25. *Secretary:* K. Powell, Pettits Senior Boys School, Romford.

Great Baddow M.C.—The monthly Model-building Competitions have been continued. Many fine models entered have included an electro-magnetic crane. General meetings have included games organised by Mr. D. G. Radford, Leader, and General Knowledge and Spelling Bees. Instructional talks on magnetism and electricity have been planned. The general discussion on the summer programme was prolific in ideas. Tennis is played regularly, and special attention is being paid to the encouragement of younger members. Club roll: 20. *Secretary:* R. Willis, "Ivydene," Malden Road, Great Baddow.



Members of the Hornsea Evacuee M.C. Leader, Mr. R. W. Shooter, who is seated in the centre of our photograph; secretary, F. Gladstone. This club was formed in association with the well-known Hornsea M.C., also under the leadership of Mr. Shooter, its founder, and is run on similar lines. The programme includes lantern lectures, cinema displays and experimental talks on scientific subjects, and is thorough and practical.

Hornsea M.C.—An interesting feature is the training of Senior members in Leadership. Mr. R. W. Shooter, Leader of the club, demonstrated how meetings are organised and carried on, and Mr. A. Tawn explained how the Woodwork course is planned. Those being trained have already given lectures, and have done very well indeed. Other meetings have been devoted to Model-building and Hornby Trains. Mr. A. Tawn gave a talk on *"Science and Warfare,"* and the Leader lectured on *"Water Supplies."* The usual games have been played, and film displays have been given. Club roll: 22. *Secretary:* P. Richardson, 14, Grosvenor Terrace, Hornsea.

St. Oswalds (Thornton Heath) M.C.—Model-building, track nights and games have formed the greater part of an attractive programme. In an interesting contest competitors were required to identify advertisement fragments prepared by the secretary. In a Mock Trial the defendant was found not guilty of travelling on the railway without a ticket, the evidence being inconclusive. Cricket, a Treasure Hunt and an open air track night have been arranged. Club roll: 25. *Secretary:* J. F. Jaques, El Molino, 5, Ingram Road, Thornton Heath, Surrey.

Exeter M.C.—There has been a revival of interest in model-building. Models completed have included a 3-ft. miniature of the Forth Bridge and a destroyer. Club discipline has been strengthened by the formulation of new rules, and excellent general progress is expected after the intense excitement caused by recent football events. Club roll: 75. *Secretary:* M. F. R. Golesworthy, 122, Old Tiverton Road, Exeter.

Totnes M.C.—An outstanding recent event was the Exhibition arranged in aid of the *"M.M."* Radio Fund. This was very successful, the proceeds amounting to £3 2s. A special effort by Mr. Macnamara, Vice-President, raised a further £2 to be added to the Fund. Innovations have included a Savings Club, a Gear Wheel Store from which members can borrow gear wheels as required, and a Cycling Section. Members have been grouped in two teams, called "Nuts" and "Bolts." Several meetings have been devoted to operations on the club's Hornby Train layout. Club roll: 20. *Secretary:* T. J. Macnamara, "Gables," Totnes.

Acton M.C.—The construction of Meccano models has been continued, and members have enjoyed realistic operations with the completed Scotch type derrick crane, which has been improved. A Film Show has been given, and Lectures on railway subjects have interested members. The associated Branch is busy with the construction of a new layout. Club roll: 15. *Secretary:* S. W. Simmons, 7, Alfred Road, Acton, London W.3.

AUSTRALIA

Maylands (Perth) M.C.—A revival of enthusiasm has followed the introduction of many new Junior members. Models built have included a ship coaler, a motor car, fly boats and other smaller structures. Other meetings are devoted to radio and electricity, and members are being given the opportunity of learning the Morse code. Games tournaments also are being held, and all Factions are showing great keenness. Club roll: 33. *Secretary:* W. Petersen, 1, Warne Street, Maylands, Perth.

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Binding 6 and 12 copies. These binding cases are supplied so that readers may have their Magazines bound locally, but where desired, the firm mentioned above will bind Meccano Magazines at a charge of 5/9 for six issues or 7/6 for twelve issues, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted as required.

Whilst the binding of the twelve Magazines is quite satisfactory, they form a rather bulky volume and for that reason arrangements have been made to bind six months' Magazines where so desired, as explained above.

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STAMP COLLECTING

The Development of Air Power

In our last issue we traced on stamps the story of naval power from early native fighting canoes up to modern battleships. It is easier to deal in a similar manner with the story of aircraft, for aviation plays so great a part in the carriage of mails that aeroplanes naturally have become a common subject for stamp designs. Most of these show civil aircraft, but a few military designs are available, and these are ample to illustrate the special features of the story.

The first stamp in our collection is taken from the Greek mythological series of November 1935, in which the 5dr. value depicts the fabled attempt of Daedalus and Icarus to fly across the Hellespont by means of wings fixed to their bodies with wax. This effort ended in tragedy. In the myth the flyers are said to have flown so near the Sun that the heat melted the wax of their wings, and they plunged headlong into the sea.

The first authentic attempt to fly was Leonardo da Vinci's experiment of harnessing himself to wings operated by foot pedalling. This historic effort is depicted on Italy's 50c stamp of 1937. Da Vinci's efforts were unavailing, and the world's first successful flight was that of the Wright Brothers at Kitty Hawk, North Carolina, on 17th December 1903. The flight lasted only 12 sec. and the distance covered was not very great, but the aeroplane was then proved a practical proposition. The Wright machine as it flew on that memorable occasion is shown on the 2c. value of the United States Aeronautical Conference issue of December 1928.

That the early pioneers of flying carried their lives in their hands can readily be realised from a brief inspection of the weird contraptions of wire and wood flown by the Wrights and by Bleriót, the first airman to fly the English Channel. Bleriót's machine is shown on a 2.25fr. stamp issued by France in 1934 to commemorate the 25th anniversary of his Channel flight on 24th July 1909.

The earliest military machine in our collection is a biplane used by Carranza's army in the Mexican revolution of 1915. This is depicted on the 40c. stamp of the Guadalupe (Mexican Constitution) Commemorative issue of 26th March 1938.

Aeroplane development was speeded up tremendously during the World War of 1914-18, but there are few illustrations that can be associated definitely with the machines of that war. The best is that of the Vickers-Vimy bomber seen on Newfoundland's "publicity issue" of 1928/29. The 15c. stamp of this issue, illustrated on this page, shows the machine in which Alcock and Whitten-Brown made the first successful transatlantic crossing. This machine had actually seen active service with the Royal Air Force during the closing days of the war.

In the later stages of progress we are spoiled for choice. Peru gives us an excellent picture of a Fairey fighter on the 2s. and 5s. values of the July 1932 series commemorating the fourth centenary of the founding of the city of Piura. The 2s. value is illustrated here. There is also a splendid Peruvian design showing a modern

There is one Zeppelin stamp that must come into our story, for it is the only one that illustrates the use of these dirigibles as an offensive weapon during the 1914-18 war. This is the semi-official issue produced by the Aero Club of Canada, with the authority of the Minister of Posts, on 26th August 1918, for use with mail carried on an experimental flight between Toronto and Ottawa. The stamps shows a Zeppelin being brought down in flames with the successful attacking aeroplane flying high overhead.

Russia provides an exceptionally fine set of Zeppelin pictures in the series of five stamps issued in 1934, but there is greater interest in the November 1938 Aviation Anniversary set issued in that country. At least three designs from this must go into our collection, and all are illustrated here. The 5k., showing a group of boys launching model aeroplanes, is the only air stamp that pays tribute to the great interest that is taken in aviation by the modern boy. The 15k. value shows a captive observation balloon, similar in form to the modern barrage balloon; and the 30k. shows a mass descent by parachute jumpers. Russia was the first Great Power to make important experiments with this method of invading enemy territories. The 10k. value of the same series is one of the few stamp designs showing the modern sport of gliding, and that too might well be taken into the collection.

As is almost always the case in a subject collection, the stamps of Great Britain do not figure prominently. There is one British stamp that should be included, however. This is the Great Western Railway's semi-official label used for the Rail-Air service and first employed on the Cardiff-Plymouth service in May 1933. The design shows a three-engined high-wing monoplane of the type then commonly employed.

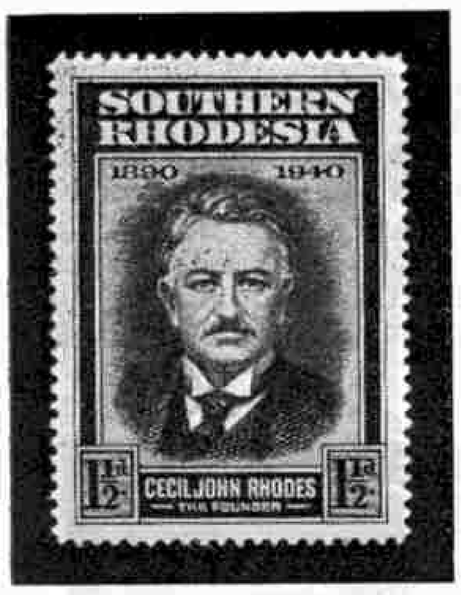
flying training school at Las Palmas on the 1s.50 value of 1936 issue.

Egypt shows a D.H.9a flying on the Cairo-Baghdad mail service. This stamp is the 27m. value of Egypt's first air mail stamps, issued in 1926. In 1933 Egypt gave us a view of a Handley-Page four-engined machine flying over the Pyramids, a design that is still in use; and later in the same year produced three very attractive designs showing a four-engined Armstrong-Whitworth "Atalanta" type machine, the Dornier Do. X, the predecessor of the great modern flying boats, and the airship *"Graf Zeppelin."* The *"Graf Zeppelin"* is the most frequently portrayed of all aircraft. Her flights across the Atlantic and round the world led to issues of stamps in the United States, Italy, Spain, Russia, and many South American countries.

New Collectors' Corner

"Demonetized" Stamps

No stamp is obsolete until it has been "demonetized," although it may have been out of issue for many years. This expression is the official declaration that a stamp issue has become obsolete, and no longer valid for the pre-payment of postage.



There is no standard practice among the countries of the Universal Postal Union in declaring their issues demonetized. Some countries leave their issues available for many years after they have ceased to be on sale. For example, in Australia all issues are still valid, including those used by the individual States, New South Wales, Queensland, Victoria, South Australia, Western Australia and Tasmania, in the days before the Commonwealth issues first appeared in 1913.

On the other hand, some countries put a very early stop to the validity of their issues. Italy's commemoratives are usually demonetized almost immediately on ceasing to be on sale. Great Britain is among the "delayed-action" countries. The stamps of Queen Victoria's reign were invalidated only some 10 years ago.

The Universal Postal Union

A special reference in our first note that might well be explained here is that dealing with the Universal Postal Union. This is an international organisation, working from Berne in Switzerland, which regulates the postal services of the World, and most of our readers will have seen its initials "U.P.U." on many of their stamps. It was founded in 1874, when 21 countries met at Berne by invitation of the Swiss Government. Almost its first business was to arrange that all mail fully prepaid in the stamps of a member country would be accepted and delivered without extra charge of postage for this service, and to fix a colour scheme so that these uniform rates could be easily recognised by the postal servants of all countries. The colours agreed upon were green for the nearest equivalent to 5 centimes in gold, that is ½d. in Britain and 1c. in Canada and the United States, and red and blue for 10 centimes and 25 centimes and their equivalents.

The Union also has to approve all new stamp issues of the member countries and to circulate details of these issues and their designs to other countries. Once every four years it meets in Congress.

Stamp Gossip

and Notes on New Issues

Southern Rhodesia's Jubilee

One of the great pioneers of the British Empire was Cecil John Rhodes, after whom the Rhodesias are named. Southern Rhodesia has now issued its Jubilee commemoration set, and one of the values carries the great Empire builder's portrait. The series generally is a worthy commemoration of Rhodes' great work, and each of the eight stamps included in it is a truly beautiful example of the stamp engraver's art. Six of them are illustrated on this page.

The full list of designs is as follows: ½d., arms of the British South Africa Company, flanked by panels showing a native, with assegai, and a native policeman. 1d., hoisting the flag at Fort Salisbury, now the capital, on 12th September 1890; this ceremony marked the beginning of British rule in the heart of Africa, and the formal taking over of the territory ceded to the British South Africa Company by King Lobengula in the previous year.

1½d., portrait of Cecil John Rhodes. 2d., a mule-drawn mail coach at Fort Victoria; before the advent of the Cape to Cairo Railway, all mails and supplies were brought by mule team from the south. 3d., Rhodes concluding peace with the Matabele in 1896; the scene is laid in the Matopo Hills where Rhodes now lies buried, and pays tribute to Rhodes' intrepid daring, for he went unarmed to the meeting. 6d., statue of Sir Charles Coghlan, first Prime Minister of Southern Rhodesia, at the entrance to the Law Courts at Buluwayo. 4d., the Victoria Falls bridge, spanning the Zambezi, which is the most important link between Southern and Northern Rhodesia.

The 1/– value is a composite of four subjects. These are portraits of Queen Victoria and King George VI, a view of King Lobengula's kraal at the time of the cession of his territory, and a view of Government House, Salisbury.

We thank David Field Ltd. for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

Centenary Stamps Contest Results

The prize-winners in the Home Section of the contest announced in "*Stamp Gossip*" in the May "*M.M.*" are as follows: R. A. J. Bern (Portsmouth); D. McMillan (Montrose); D. A. Neilson (Dundee); F. W. Sharp (Ludlow); J. A. Smith (Oxford); D. H. Tomkinson (Wells Green, Nr. Crewe).

Each of the prize-winners has received one of the special envelopes issued by the Royal Philatelic Society in aid of the Red Cross and St. John Fund. These are first-day covers of the centenary issue, and bear specimens of each of the six stamps of the issue, with a special postmark.

Feathers as Stamps

Feathers are being used to serve as postage stamps among the guerilla bands of Chinese still resisting the Japanese effort to conquer China. It is impossible for them to maintain an ordinary postal service. Letters therefore are carried from one band to another by the guerillas themselves, the degree of importance of the message being indicated by the number of feathers impaling the missives. One feather is used for ordinary routine communications, two for "post-haste" letters, and three for "special express."

Pan-American Union Commemoratives

No less than 17 of the 21 countries forming the Pan-American Union of North, South and Central American States have issued special stamps celebrating the 50th anniversary of the founding of the Union and it is understood that the remaining four States have issues in preparation.

These issues make a most interesting collection, since most of them show the flags of the 21 States in full colours. Argentine is one of the few that have not adopted this idea; instead the stamp shows a map of the Americas encircled by laurel leaves. Brazil shows a composite of portraits of Presidents Roosevelt and Vargas. Ecuador and Paraguay have produced 9 and 8 stamps respectively.

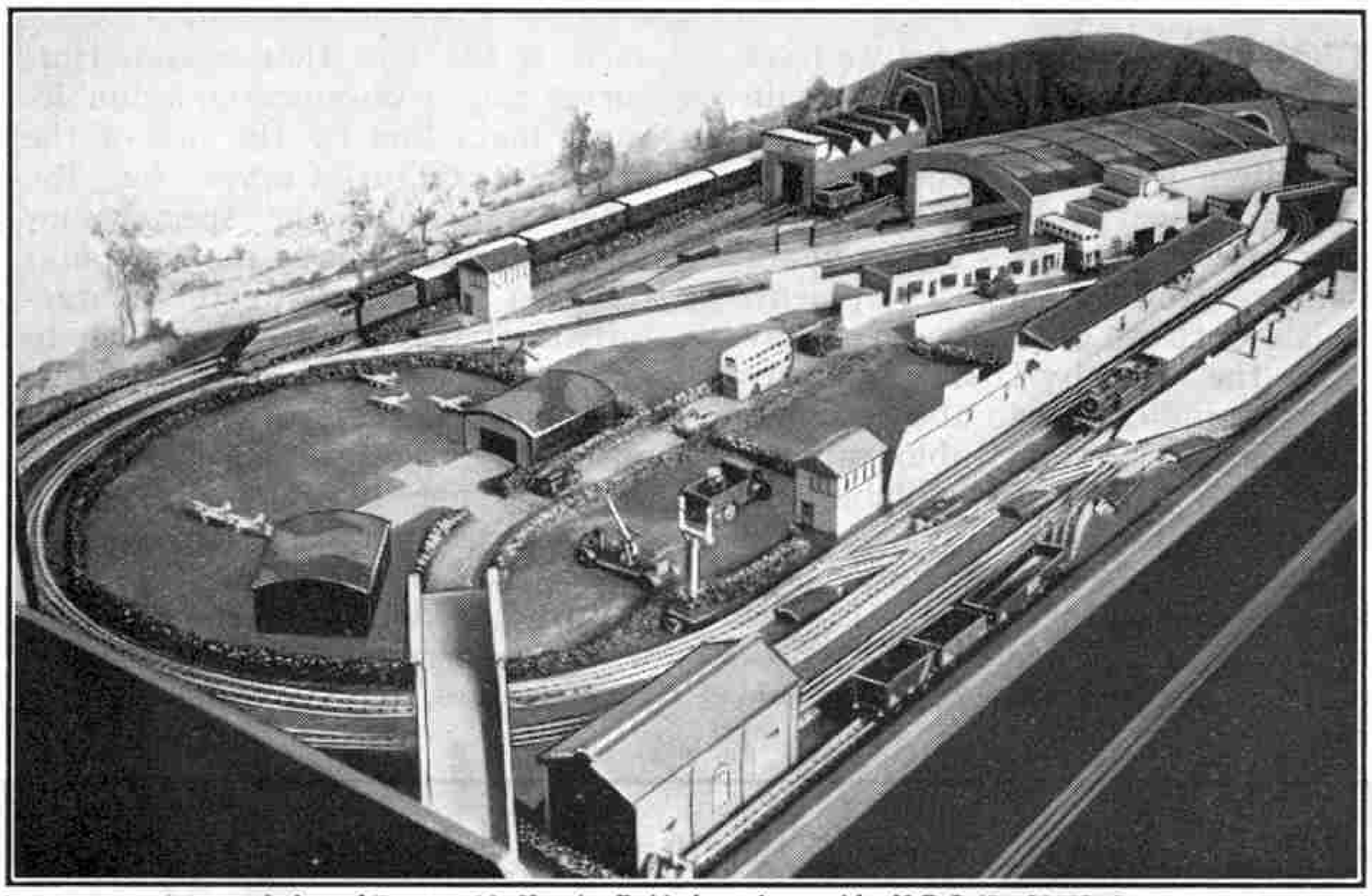
A Hornby-Dublo Layout with Sectional Control

A Portable System for a Small Space

THE illustrations reproduced on this page show an interesting Hornby-Dublo railway that is in course of development by H.R.C. No. 70408, St. Athan. The possibility of its owner being instantly moved about, and reasons of space, have made it necessary for the system to be of a type that is readily dismantled and yet easily set up again in full working order. Therefore the baseboard on which the whole layout is arranged is made to separate into two halves, each complete with track accessories and wiring. In spite of this the line is effectively divided into separate sections and is fully equipped with electrically-operated points and their switches, and control switches for the various sections.

The baseboard itself is soundly constructed of tongued and grooved boarding $\frac{7}{8}$ in. thick, which makes an excellent foundation for the system. The boarding is covered with roofing felt, the surface of which represents very well the ordinary "ground level" of a railway system, yards, roadways and so on. The complete space occupied by the line is 7 ft. by 3 ft. 6 in., each of the two sections into which the baseboard separates being 3 ft. 6 in. square. The board is arranged so that all electrical wiring is carried out underneath out of sight, and a neat and clean appearance is thus secured. Holes are drilled at points where the wiring has to come through the surface right by the particular items to which the individual connections are made.

The main plan of the line is an oval of double track with an internal branch serving a terminal station, goods yard and an engine shed reserved for tender engines. Along one of the longer sides of the oval main line is a passing station that has, in addition to its main platforms, a terminal bay platform. At the opposite end of the layout to this are two sidings, one of which leads into an engine shed for tank locomotives.



A general view of the portable Hornby-Dublo layout owned by H.R.C. No. 70408, St. Athan.

Transformer No. 2 fitted in between two Dublo Controllers. One Controller supplies the inner track of the main line together with the terminal yard and shed tracks leading off it, and there are six D1 Switches governing Electrically-Operated Points.

The outer track of the main line forms a separate circuit, there being an insulating gap between the individual points forming the crossover joining the up and down main lines. This outer circuit is connected to the second Controller, together with the sidings and track on the outer part of the system. Hornby-Dublo Electrically-Operated Signals are provided, and in all cases up to the present these are wired to work together with the points to which they apply. There are however two D1 Switches spare; these are being reserved for use with two further signals that are to be installed one at each end of the tunnel shown in the accompanying diagram.

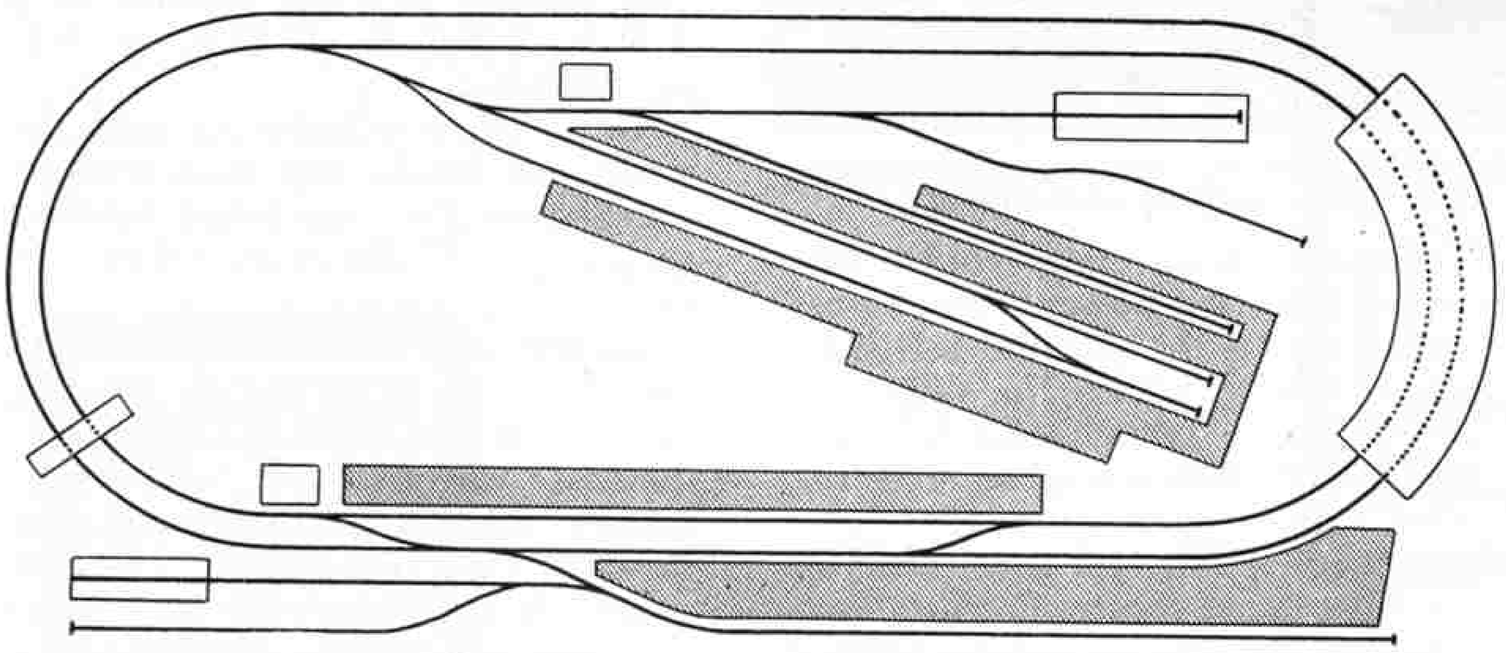


Diagram of the layout described on this page.

In addition to the division of the system into two main circuits, these circuits are themselves split up into a number of separate sections so that individual tracks or sidings can be rendered "alive" "dead" as required by the running operations. The switches governing these sections are grouped in the control box so that the operator has practically full remote control of every movement on the system. Where it is necessary for the various wires to be cut to allow for the separation of the two halves of the layout, plug-and-socket connections are used so that the completion of the different circuits when the layout is being made ready for use is a simple matter.

The general appearance of the system is well shown by the upper illustration on this page. Hornby-Dublo locomotives and rolling stock are in use, also rails, points, signals and so on. The signal cabins are Dublo products too, but the remaining buildings such as stations, and structures forming part of the lineside effects, shops, aircraft hangars and so on, have been home-made specially to fit in with the general scheme of the line.

The two-road tunnel, for instance, has its ends or mouths made up of plywood cut to shape and covered with "brick paper," which looks most effective. The top covering, which is laid over a framework arranged in the manner often described in these pages, is of green cloth. This it has been found is not a very satisfactory material, so that the "top" is to be renewed at a suitable opportunity. Possibly the dressing of the material with paint would have given better results.

The hedging used on various parts of the layout is the standard Hornby product intended for Gauge 0 railways. It has been adapted for the Hornby-Dublo system by the removal of the wooden base, the actual hedging material being then partially flattened by hand, and cut into two strips lengthways with scissors. These strips are then fastened down to the baseboard with pins, and the hedge thus formed has quite a natural and pleasing effect.

The electrical arrangements on the layout are particularly interesting, controls and so on being concentrated in a control box attached to the baseboard, the wiring being led thence to the different items as described previously. Mains current is led to the control box by means of a master switch and two-pin plug mounted outside the actual box. Inside the box is a Dublo

Perfection in Miniature Railway Working

Remote Control on the Hornby-Dublo System

FOR the past few months we have considered in these pages certain definite schemes of layout and operation for Hornby-Dublo railways, and particular attention has been given to the uses of the newer items of Hornby-Dublo equipment. This month we deal more generally with the Hornby-Dublo Railway System, indicating to the beginner planning a Hornby-Dublo railway just what material is available and how it can be used.

One of the greatest advantages of a Hornby-Dublo railway is the relatively small space that is necessary to accommodate a reasonable layout. For instance, a space of 6 ft. by 3 ft. only is required for several of the layouts shown in the folder "*Suggestions for Hornby-Dublo Electric Railway Layouts*," and a remarkably comprehensive system can be laid down in a space 8 ft. by 4 ft. The various Hornby-Dublo track components also are very adaptable. Sidings and loop lines can be arranged in a regular manner, and the Right-hand and Left-hand Points are so designed that a pair of each kind together can be made to form a crossover connecting two main line tracks. Equally important too, and particularly effective from the point of view of realistic appearance, is the fact that symmetrical curves can be obtained on a double-track main line by the use of the standard radius Curves for the inner track and the special new Large Radius Curves for the outer track. A splendid "sweep," characteristic of real practice, is given to any curved stretch of track in this way and this point is well brought out in the upper illustration on the opposite page, in which a Hornby-Dublo express is seen rounding the outer track of a double-road curve.

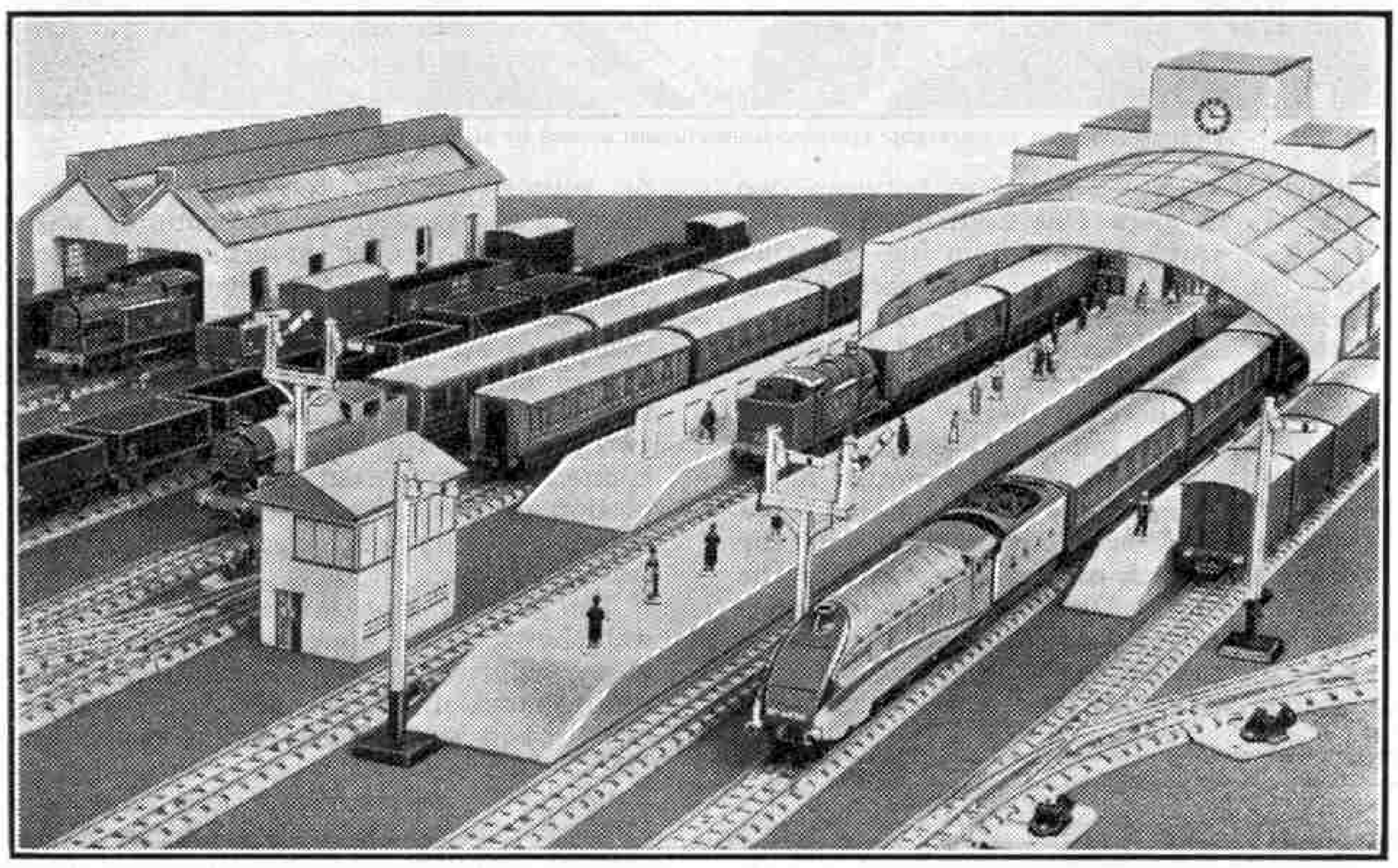
Both clockwork and electric railways can be run with Hornby-Dublo Locomotives, and the same types of locomotives are available for the two forms of motive power. For express trains there is the splendid L.N.E.R. streamlined "Pacific" No. 4498 "*Sir Nigel Gresley*," which with its corridor tender reproduces so well the giant "A4" class engines that have made such a name for themselves on the East Coast Route. For local and goods trains there is a standard 0-6-2 Tank Locomotive available in the style and finish of each of the four great British railways. This is a very useful type of engine for the miscellaneous duties on all Hornby-Dublo railways.

Most interesting and realistic passenger trains can be made up with Hornby-Dublo stock. For the present L.N.E.R. vehicles alone are available. These include a Two-Coach Articulated Unit, as so often seen in actual practice on the L.N.E.R., and a separate bogie Coach. The two-coach unit includes a composite or brake-end vehicle, and thus forms in itself a complete train that can be used for light fast expresses or for suburban work. For heavier trains the separate Coach can be used in conjunction with the Two-Coach Unit to give a formation that has a very smart and realistic appearance, as the illustrations accompanying this article show.

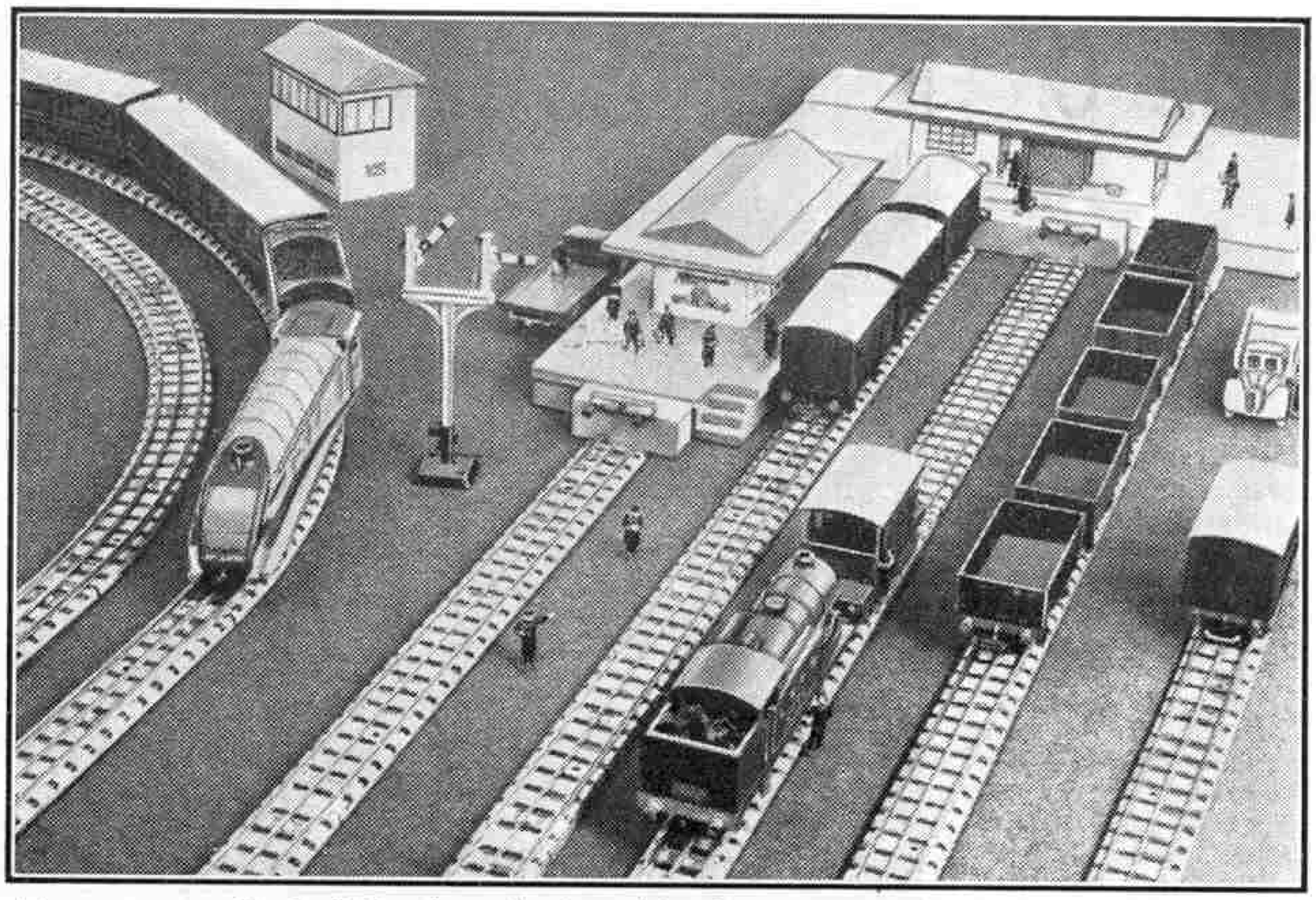
Making up goods trains of many different kinds also presents no difficulty, for the Hornby-Dublo range includes a splendid variety of vehicles. There are open Wagons and covered Vans for general traffic, standard high-sided Wagons as used for coal and minerals, and a splendid selection of Vans for perishable freights such as meat and fish. Special-purpose vehicles are represented by the Tank Wagons and the particularly attractive L.N.E.R. bogie High-Capacity Brick Wagon. Each company's latest practice is reproduced in the Brake Vans, which are necessary to complete any freight train, so that the correct "atmosphere" is given to the miniature railway system, whether it is L.M.S., L.N.E.R., G.W.R. or S.R. in character.

In all these vehicles, as with the passenger stock, the bodywork is finished by the tinprinting process, so that practically every detail seen on the real wagon or coach is reproduced with great accuracy. Completeness of detail in the running gear is looked after by the use of die-cast wagon bases and bogie frames, and as all wheels also are die-cast easy running is ensured.

On electrically-operated systems the complete remote control of the locomotives, added to the use of the special automatic couplings fitted to all Hornby-Dublo stock, gives the most realistic results when trains are being assembled in the sidings or at stations. The couplings engage positively when the vehicles are pushed together by the locomotive,



A realistic terminus, yard and Engine Shed. The station is particularly effective, with its passenger platforms, accommodation for perishable traffic vans, and carriage sidings outside the actual building.



A busy corner on a Hornby-Dublo railway, showing an interesting arrangement of two Goods Depots used together. The platform buffers used are City Station Outfit components.

and as there are no minute working parts there is nothing to get out of order. The "engine driver" soon gets the "feel" of things, and with a little practice is able to back on to his train, or to push individual wagons together, with just a gentle touch.

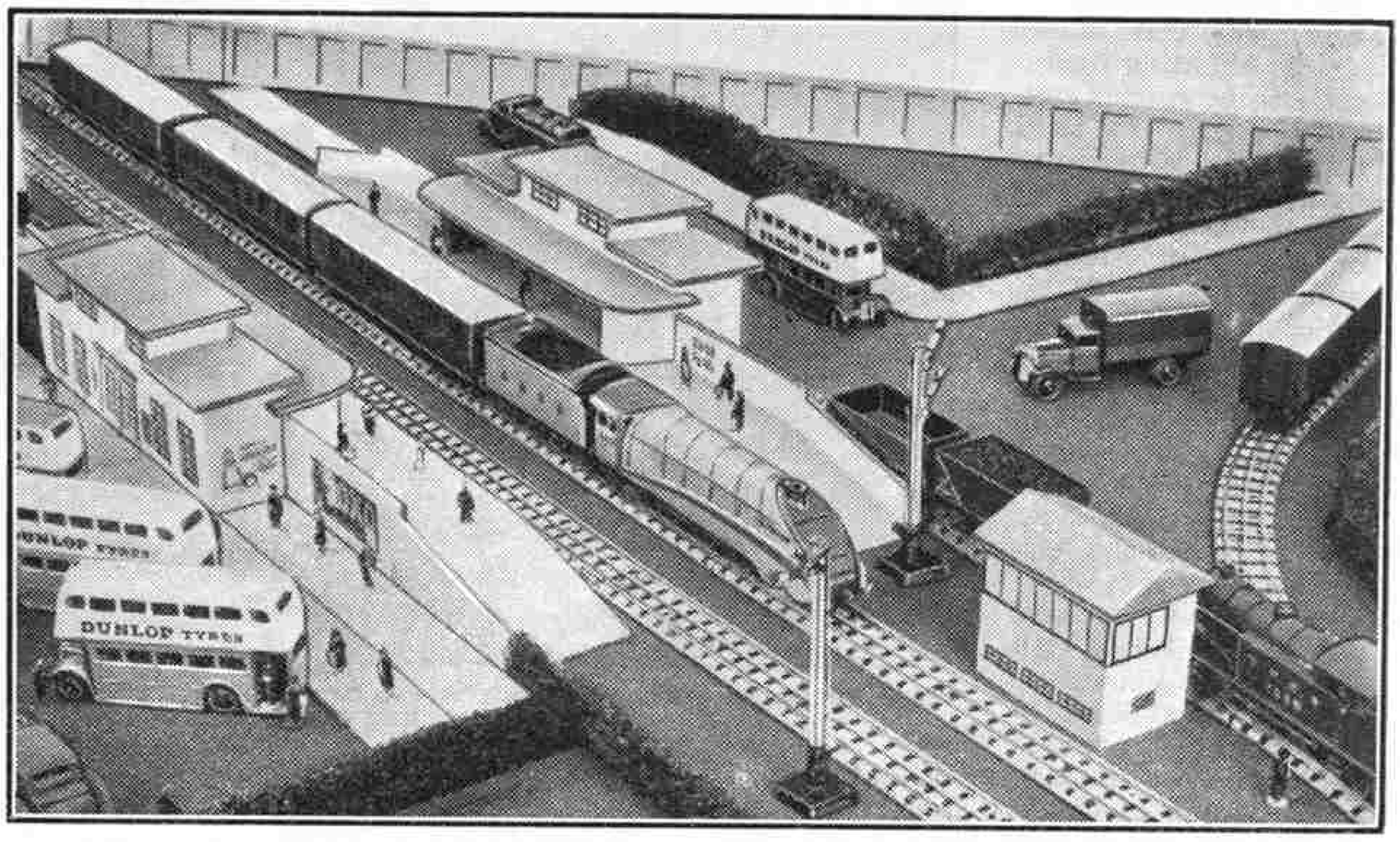
Remote control has now been extended to the operation of Points and Signals by the introduction of the Electrically-operated Points and Signals. In the case of the Signals the operating gear is housed inside the base; the Points operating mechanism is fitted into a small cover at the side of the track in just the same way as a real points motor. Control is afforded by means of special Switches D1, which can be assembled in groups at the lineside at convenient points, or concentrated at a control panel or switchboard.

This remote control feature adds a great deal to the realism of a Hornby-Dublo railway. Points are operated and routes are set up for trains, and the appropriate signals are worked, in the same unobtrusive manner as in real railway operation. If required Points and the Signals referring to them can be so wired that they operate together from the same Switch.

The degree of control possible as regards the trains themselves has been improved by the inclusion of the Isolating Rail and its corresponding Switch D2. The Isolating Rail incorporates an insulating gap in its centre rail. This makes it possible to isolate any given length of track, either main line, platform road siding or loop. Connections from the Isolating Rail to the Switch referred to permit the length of track concerned to be rendered "alive" or "dead," as required. Thus several engines can stand together on isolated sections in the engine shed or yard, yet one can be worked in or out, according to its position, without affecting the others. Similarly, an arriving engine at a terminal station can be held at the buffer stops while another engine backs on to its train to take it away on another journey, or to the carriage yards. There is in fact practically no limit to the possibilities of realism in operation when a layout is divided up into suitable sections by means of the Isolating Rail.

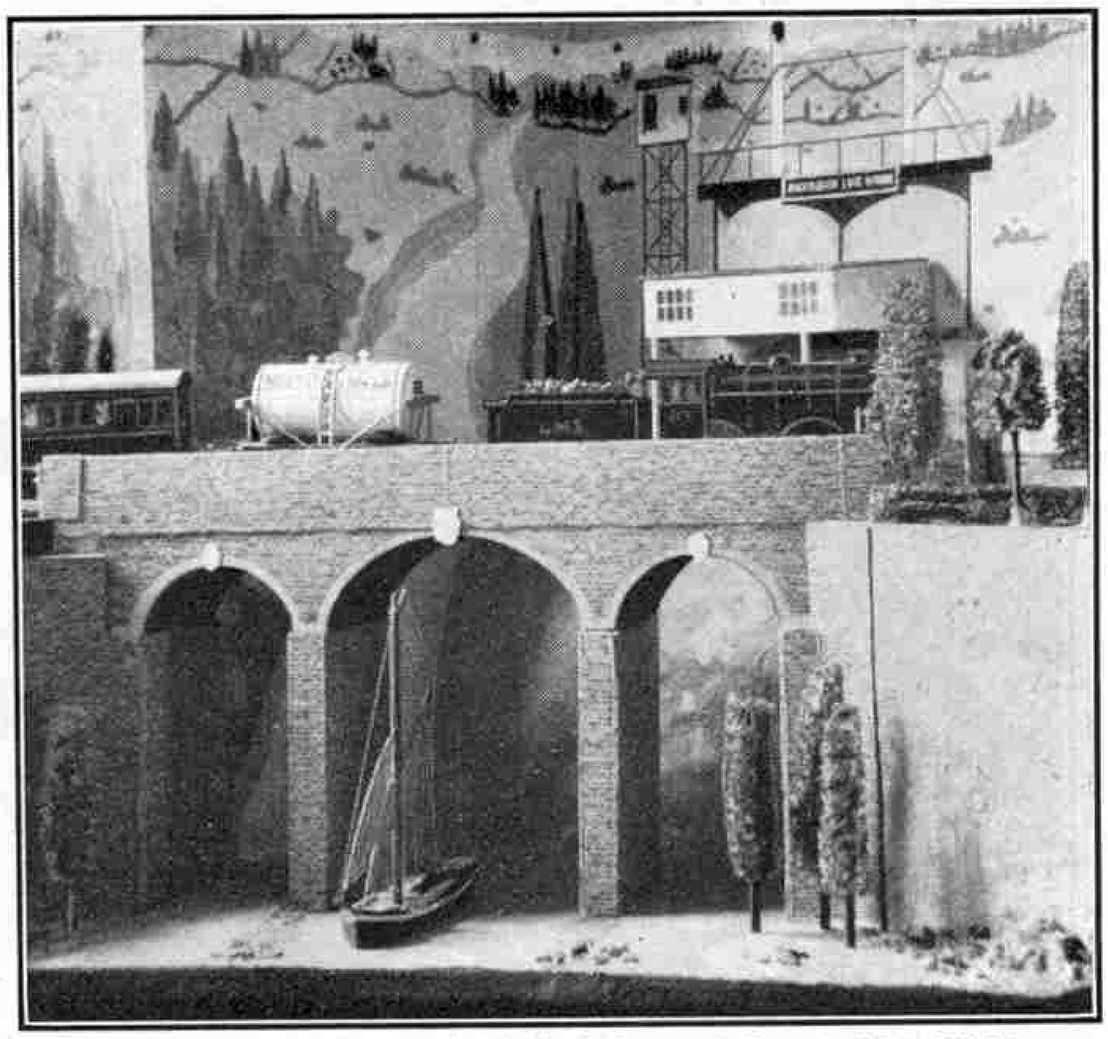
Neither passengers nor "employees" on a Hornby-Dublo railway can complain about the design or style of the various buildings included in the Dublo range. All are soundly designed on modern lines, look extremely business-like, and offer ample accommodation. They are all very adaptable, and can be used alone or in conjunction with one another, as will be realised from the accompanying illustrations. Passenger traffic is dealt with by means of stations of the ordinary main line passing type, and either island or side platform types can be used independently or in conjunction to form a double or multiple-road station.

Goods traffic is catered for at a characteristic Goods Depot, which has a spacious loading "bank" or platform for the handling of rail and road traffic. Locomotives are housed in an Engine Shed of up-to-date pattern, its well-lighted interior contrasting strongly with that of some of the older structures sometimes found in real life! This applies also to the City Station which, as model railway buildings go, is in a class by itself. The Station is boxed as a complete Outfit of separate components, which can be assembled to form either an imposing terminal or a through station of the first importance. Combinations of both types of station also are possible, for the various components are available separately. Platforms of different lengths or widths can be arranged and, in short, the effect of a real station, well-laid out but not necessarily symmetrical in plan, can readily be imitated.



A suburban station with attractive surroundings. The use of various Meccano Dinky Toys Components, in conjunction with the Hornby-Dublo figures, makes the scene very life-like.

A Realistic Gauge 0 Railway



A passenger train crossing the brick-built viaduct on the layout of P. R. Wickham.

THE *"Westcliff-Enderleigh"* railway is the name given to a Gauge 0 layout owned by a keen *"M.M."* reader, P. R. Wickham, of Leicester. It represents an imaginary L.M.S. branch line situated "somewhere in the Midlands." The purpose of the line is to connect the industrial town of Westcliff with the country district of Enderleigh. Westcliff obtains much of its coal from Enderleigh, for both industrial and household purposes, as well as various country products such as milk and fruit. Enderleigh also has a growing housing estate where many Westcliff business men live.

So much for the "history" of the district served by the railway. The layout itself, which is worked by clockwork engines, is arranged on the non-continuous "terminus to terminus" principle, and is built on a raised staging 30 in. above floor level in a room 15 ft. by 7 ft. The main line is roughly U-shape, following three walls of the room, with the two stations lying parallel to one another along the longer walls. This is a very convenient arrangement, as it is possible to control the layout almost completely without moving from a position between the stations. The actual main line is single track, but is doubled at the stations, where the two lines converge on turntables at the end of the platforms to allow incoming engines to run round their trains.

There is a goods yard alongside the passenger station at Westcliff, as well as three carriage sidings and a locomotive yard. At Enderleigh there is no separate goods yard, freight trains being received and dispatched from one of the platform roads. From this road is thrown off a loop line connecting with the turntable; this allows simple shunting operations to be carried out.

The line is laid throughout with Hornby tinplate rails and points. The track is laid on strips of "roughcast" wallpaper, 2¼ in. wide, painted grey to represent ballast. The baseboard in the region of the tracks is coloured a warm matt brown to represent earth, the only departure from this being in the terminus yards at Westcliff, where "ballast paper" is dispensed with and the baseboard is painted matt black to represent an asphalt yard. Another improvement to the track is the fitting of dummy wooden sleepers in between the tinplate ones to give the closely-spaced effect seen on real lines, and this work is nearly complete.

Westcliff station is of modern "suburban" design, with an island platform, just over 5 ft. in length, between the two tracks. The actual station building is raised over the tracks on a bridge that carries also a car park and the "concourse" in front of the building, from which the platform is reached by a covered stairway.

On the platform itself are lamp standards, a bookstall, and one of the familiar *"Rocket"* "penny-in-the-slot" models in its glass case. Outside the station an overhead signal cabin spans the tracks. This is fitted up inside with a dummy lever frame and block instruments and is manned by two signalmen. All these items and most of the other accessories and buildings on the layout are made at home from wood, cardboard, and various odds and ends, finished with brick and rough-cast papers, poster paints and enamels.

The goods yard at Westcliff is complete with a loading platform and a small shed. There are also a coal office and oil storage tanks made from cylindrical shaving stick containers.

The locomotive yard has a two-road shed of modern design and a siding serving a small coaling plant, entrance to the yard from the platform roads being via the turntable. The turntable itself is made from wood and cardboard, with girder work of matchsticks glued on the side-frames before painting.

"Westcliff" Station, with a three-coach train on the right, a local train in the centre, and a mixed freight train on the left.

Enderleigh station is of the small "country" type, with the office building on a short platform alongside the main island platform. The two are to be joined by means of an overbridge. There is a small shed with loading bank serving the goods loop. A water tank is situated at the platform end, near the turntable, where incoming engines can "take water" before running round their trains.

Hornby Trees and an appropriate scenic background complete the effect. The background which, when completed, will stretch right round the room, is painted in water-colours on cartridge paper. It shows country scenery round Enderleigh, with fields, roads, a stream, and part of the housing estate already mentioned. At Westcliff various factories are represented.

A viaduct carries the main line out of Enderleigh over a bend in the "river" 40 scale feet below. It is built from wood and cardboard, finished as brickwork with light stone facings. At the back of it is an embankment that carries a small limeworks served by a private siding. Actually only part of the works is built in full, the rest being on the painted background.

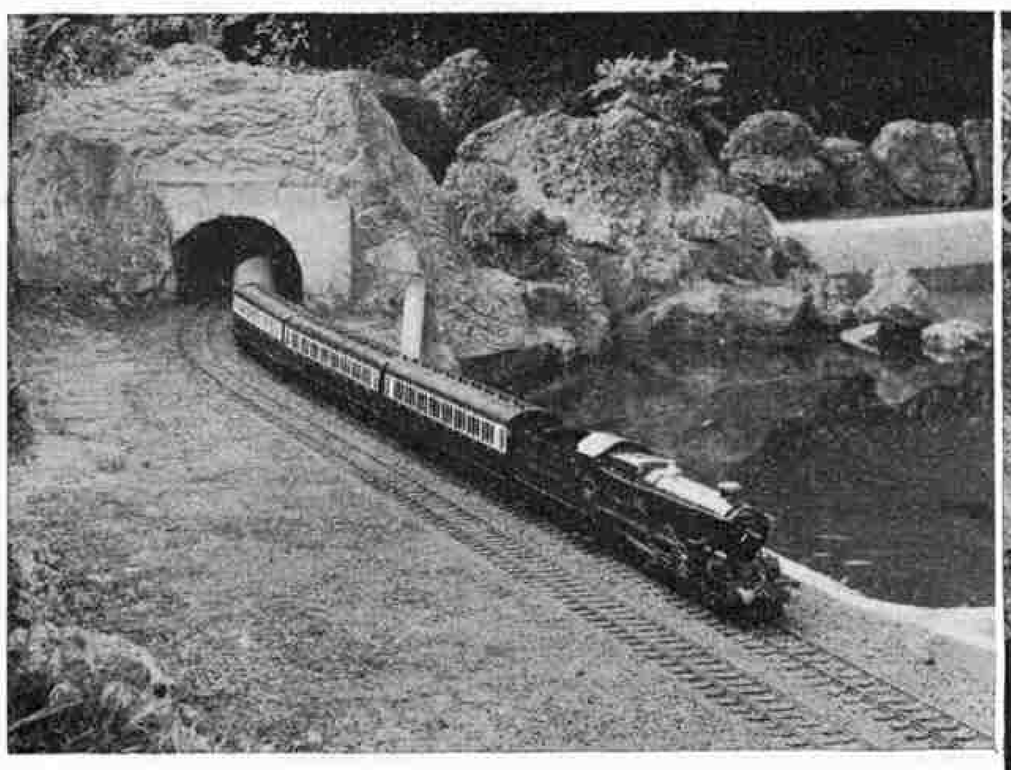
A small point, but one that adds greatly to the realism of the layout, is that all tracks are "enclosed" as demanded by law in real life. This is done either with Hornby Hedging, or with fences made from matchsticks and white cotton, to imitate "post and wire" fencing.

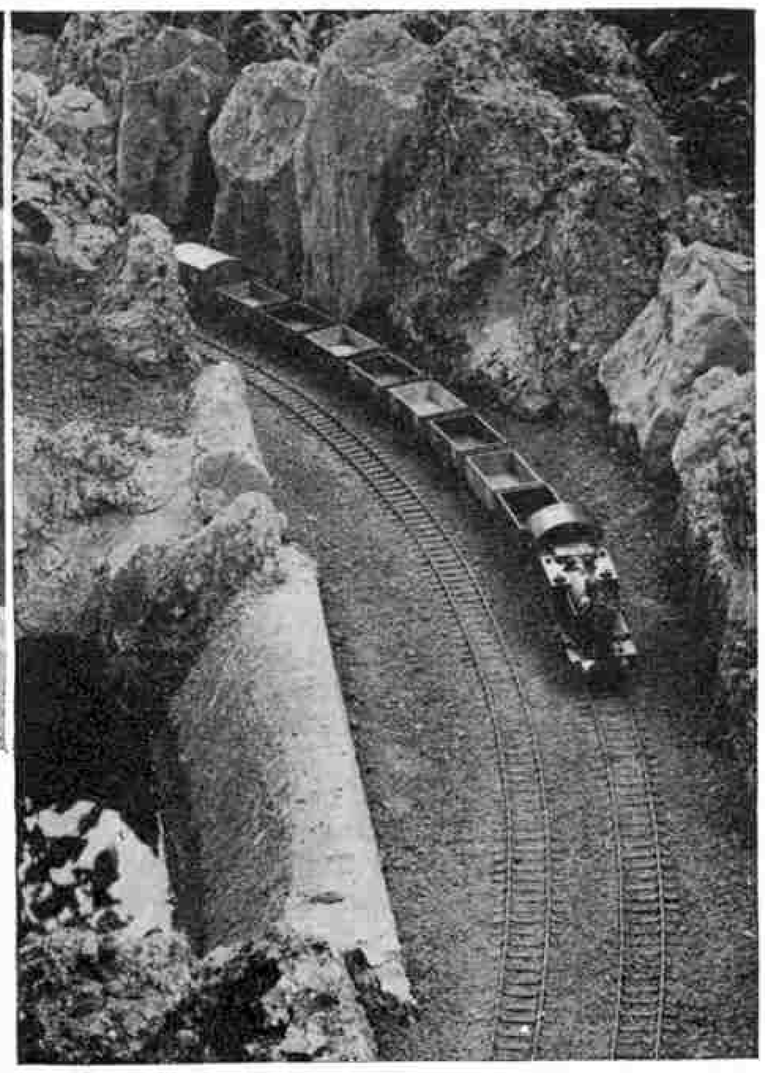
The passenger stock is made up into set trains, as often advised in the *"M.M."* There are at present only three locomotives, two being Hornby. Most of the passenger services are hauled by an L.M.S. No. 1 Special Locomotive, nearly 10 years old but still going strong. The most powerful locomotive on the line is a No. 1 Tank that will pull practically anything. The third engine is an 0–4–0 Diesel shunter with a Hornby mechanism. An L.M.S. No. 2 Special Locomotive probably will be added shortly.

South Devon in Miniature

An Interesting Garden Railway

HAVING travelled a considerable number of times to Teignmouth and the West, and having always been particularly impressed by the beauty of the Great Western line running by the sea through Dawlish and Teignmouth, I decided to try to reproduce that famous sketch of coast on the miniature railway I was planning to construct in my garden at Hampstead.





Two views on the miniature South Devon line. Left—passenger train emerging from a tunnel alongside the sea. Right—Goods train hauled by 2-6-2 tank. Illustrations by courtesy of "Great Western Railway Magazine."

My garden is approximately 100 ft. long by 36 ft. wide, and on drawing a rough plan I found that by sharpening the curves somewhat and standardising them at a radius of 9 ft., it would be possible to build something closely resembling the original—without interfering with the attractions of our modest garden.

The photographs reproduced give a good idea of the task I had set myself. The pond to represent the sea was the first item to be tackled. Completed, it holds 200 gallons of water. Next, I commenced to build up a rockery and deposit fairly large quantities of earth to form a background to resemble the cliffs.

Up to the present, over 40 ft. of double road has been laid, this being equal to roughly a third of a mile in actual railway practice. Track laying is tedious work; each yard of track has between 50 and 60 sleepers and, of course, double that number of rail chairs and four times that number of the minute pins used to secure the chairs to the sleepers. It was evident that I was in for some detail work when I found that my first order for track material must include 7,000 sleepers and 10,000 moulded chairs.

The track is fairly well ballasted and is just becoming nicely settled. From experience I should say that it will last out-of-doors for between two and three years, although certain parts will have to be taken up and relaid at times owing to the ravages of the weather. I find that the heat of the sun has a far more harmful effect than rainy weather.

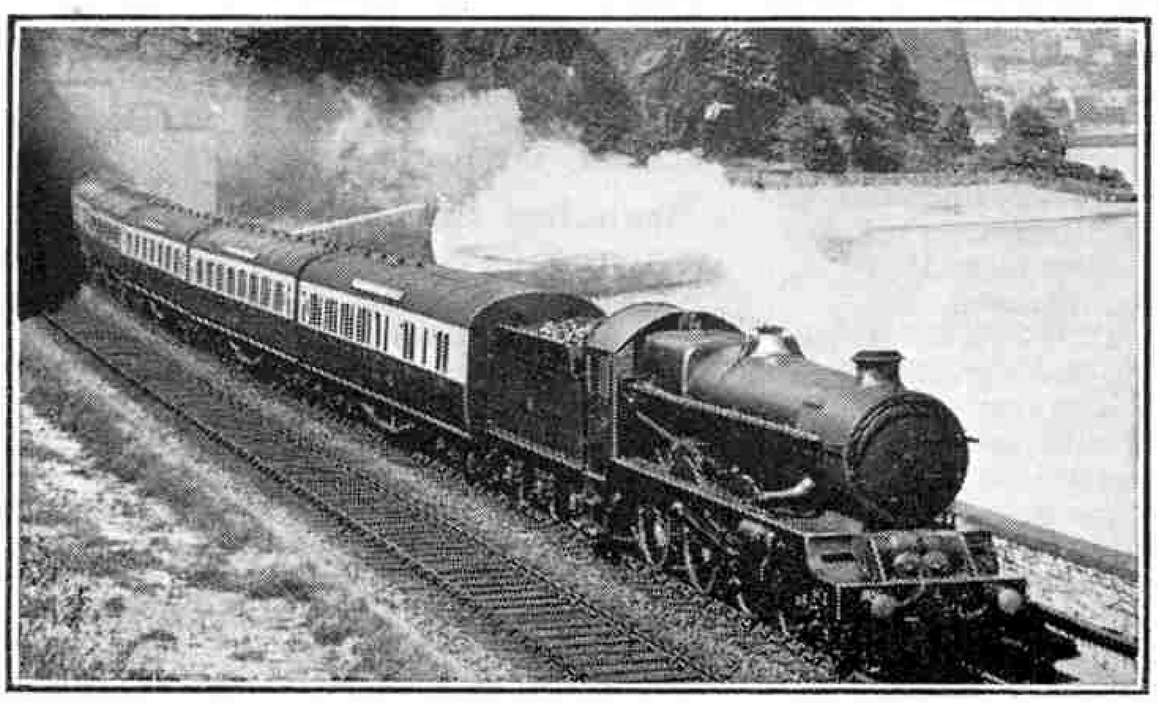
The track gauge is 32 mm. and the wheels of the locomotives and rolling stock have a measurement of $20\frac{1}{2}$ mm. between the flanges. The actual tyre of the wheels is 4 mm. wide and the depth of the flange about $\frac{3}{4}$ mm. This represents a scale of 7 mm. to the foot and gives a fairly correct appearance.

At the present moment I have only one rebuilt "6000" class locomotive, one "County" class and one 2–6–2 (Tank), all propelled by clockwork. Although these give a realistic appearance in performance, I am hoping one day to add a "6000" class "live steamer" to my stud.

With regard to the rolling stock, the coaches are based as nearly as possible on Great Western main-line practice, but at the present time I am woefully short of them. Goods stock I am not worrying about very much at the moment, but as will be seen from the second photograph there are sufficient to make a short train.

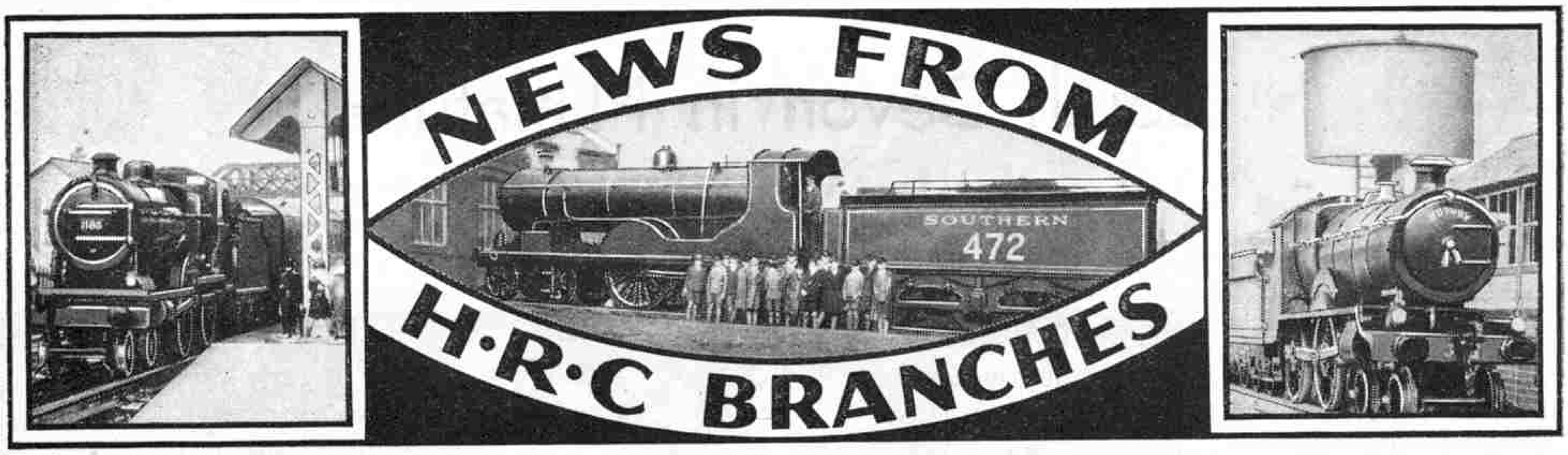
I expect a good number of readers will blame me for not putting the correct lamps on the "King" engine in the photograph. I may say that I have already severely censured myself for this shortcoming, which was caused by the railwayman temporarily forgetting his job in the enthusiasm of the photographer.

R. LENNARD.



The prototype "Cornish Riviera Limited" on sea wall between Dawlish and Teignmouth.

This article and the illustrations are reproduced by courtesy of the Editor of the "Great Western Railway Magazine."



ACTON.—Both electric and clockwork trains have been run on the combined Hornby-Dublo layouts of the secretary and one of the members. A special track meeting was devoted to operations on a Hornby Electric Layout, when all members present were given opportunities of controlling the trains. Plans have been made for the building of a new Branch layout. Darts tournaments, film shows and Lantern Lectures also have been arranged. New members are required, and those interested should communicate with the secretary, S. W. Simmons, 7, Alfred Road, Acton, London W.3.

NEW SOUTHGATE—The Branch rolling stock and track material have been overhauled and a track consisting of rails for clockwork operation laid down. Goods and passenger services have been run. Plans are being made for the completion of an electric layout, and the rails are to be raised to table height as soon as possible. Secretary: H. L. Treasure, 35, Ryhope Road, New Southgate, London N.11.

WATERLOO (DUBLIN).—Regular meetings have been held for track operation on the Branch layout, which is based on the Kent and East Sussex railway. Regular timetables are worked, typewritten copies being issued and posted exactly as is done on real railways. The Dublin-Bray section of the G.S.R.(I) passes the Branch Room, and operations on this are keenly followed by members. Secretary: S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

ROSEDALE (BIRMINGHAM).—Interest in Branch work has increased. Members have repainted the Branch rooms and installed an electric fire and arm chairs. The next step is to re-erect the Branch track. General knowledge and observation tests have been held, and at one meeting members were given subjects on which they had to speak for five minutes. A special Junior section has been formed. Secretary: L. A. D. Hamblin, 19, Katherine Rd., Bearwood, Birmingham.

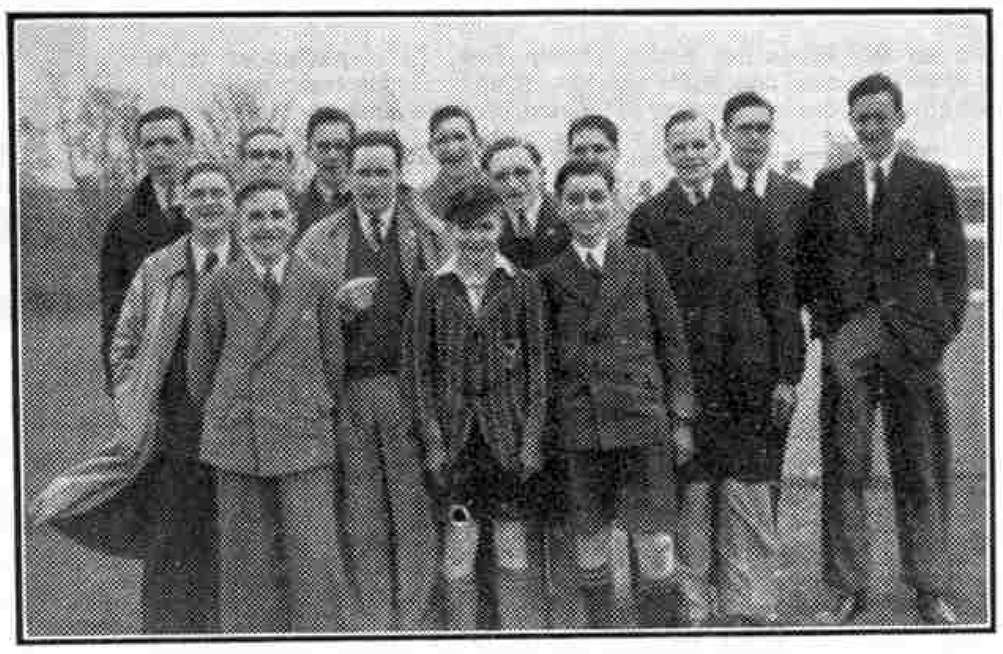
KINGLASSIE.—At recent track meetings timetable running was in operation. A miniature *"Flying Scotsman"* was run, and the Hornby *"Eton"* and *"Bramham Moor"* did good work on various train services. Other meetings have been devoted to discussions, and a visit has been paid to Waverley Station, Edinburgh. An Exhibition in aid of the *"M.M."* Radio Fund is to be held in a hall kindly loaned by the Church Authorities. Secretary: W. Duncan, "Helen Dhu," Kinglassie, Cardenden, Fife.

MONKSTOWN (Co. DUBLIN).—Several timetables have been tried on the Branch track, and a very successful one has been worked out and put into practice. A control panel has been installed. The Inchicore Railway Works of the G.S.R. (I) have been visited. There members were allowed on the footplate of No. 801 *"Macha,"* the second of the new 4–6–0 engines, a run on the first of which was described on page 164 of the April issue of the *"M.M."* Kingsbridge Railway Station also has been visited and more outings are being arranged. Secretary: R. D. Pierce, 20, Monkstown Rd., Monkstown, Co. Dublin.

ROCKPORT SCHOOL.—Many improvements have been made to the Branch track, with very satisfactory results. Further work is being carried out, and this is expected to lead to even better track running. Secretary: P. C. L. Cosgrave, The Rectory, Grey Abbey, Co. Down.

BASSETS SCHOOL (FARNBOROUGH).—Weekly track meetings have been held, in accordance with the Branch practice, and the track has been laid out of doors when the weather has been suitable. Main line working has been carried on, and branch trains connecting with expresses have been run from junctions. Timetable operation is being practised, and will become a regular feature of operations. Secretary: R. C. P. Gulliver, Marsland, Farnborough, Kent.

SOUTH-WEST HOUNSLOW.—At one track meeting remotely controlled signalling was attempted. This was not very successful at first, but the experience will be a help to future operations of this kind. At all meetings the fun was furious, and members showed great skill and quickness in carrying out the operations necessary to keep the trains running according to plan. Discussions on Branch railway practice have been held. Secretary: R. Bower, 12, Walnut Tree Road, Heston, Middx.



A group of members of the Northampton Branch, No. 284, with visitors from the Rugby Model Club. The Northampton Branch, Chairman, Mr. G. L. D. Hodges, secretary, D. J. Rushton, was incorporated in March 1935. Track operations form the principal feature of the programme. Excellent timetables are followed, and members are encouraged to use initiative in operations.

WHITECRAIGS (NR. GLASGOW).—Attendance at meetings has improved. The track has been relaid, and more stock, mostly Pullman coaches, acquired. Secretary: A. T. Henderson, "Studley," Treemain Road, Whitecraigs, Glasgow.

AUSTRALIA

MELBOURNE—At one meeting members took part in a series of tests to decide who should have the honour of driving a new locomotive. The winner duly brought the new engine into service at the next meeting. This was a Hornby E220 Special, of which the Branch now possesses four. Four trains headed by these locomotives were operated at the same time on the layout, a proceeding that demanded quick and accurate work on the part of members. Members of the Branch took part in the Models Exhibition, held in Melbourne Town Hall, on behalf of war charities. Visits have been paid to places of railway interest, and to picture houses showing films that included railway scenes. Secretary: L. Ison, 8, Hayes St., Northcote, N.16, Victoria, Australia.

Proposed Branches

HIGH WYCOMBE—Masters A. J. Birch and E. Child, "Fairholme," Castle Street, High Wycombe.

HULL—T. England, 82, Wellwyn Park Avenue, Hull.

LEWES—K. Kitching, 3, Eastgate Wharf, Lewes.

NEW ZEALAND—T. Patten, 40, Margaret Avenue, Mt. Albert, Auckland, N.Z.

STOCKPORT—E. Barlow, 21, Churchill Street, Heaton Norris, Stockport.

SWANSEA—W. J. Thomas, 14, Glan-yr-afon Gardens, Sketty, Swansea.

WAKEFIELD—F. Hudson, 39, Eldon Terrace, St. John's, Wakefield.

INDIA—Mr. B. K. Hanumantha Rau, B.A., 13, Vyasarao Street, Thyagarayanager P.O. Madras, South India.

BOGNOR REGIS—D. Barnes, 40, Havelock Road, Bognor Regis, Sussex.

Branches Recently Incorporated

390. GOUDHURST—Mr. D. A. Fairman, The Cottage, Antisden Green, Goudhurst, Kent.

391. BIRMINGHAM—Mr. H. J. Dugard, Boulton Road School, Handsworth, Birmingham 21.

392. LONDON—Mr. A. S. Hart, 46, Ravenscraig Road, New Southgate, London N.11.

393. NOTTINGHAM—Mr. H. E. Dear, 3, Aylestone Drive, Aspley, Nottingham.

394. CHORLEY—Mr. F. Rhodes, 77, Bolton Road, Chorley, Lancs.

HORNBY RAILWAY COMPANY COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

HIDDEN WORDS	CLUES	HIDDEN WORDS	CLUES
-X--X-- -XX-	For preventing wheel slip.	-X---X---XX-	Name of an early locomotive.
-XXX- -XX-	A giant L.M.S. locomotive.	-X----X-X	Part of the permanent-way.
-X--X	For controlling purposes.	X-- -X--	Are in the engine shed.
-X-X--X- -X--	Shows points are fully closed.	-X--X-X--	On all "crack" express trains.
---X--X-	Essential part of a locomotive.	-X---X--X	Situated near the engine shed.
--X-X --X--	American term for chimney.	-X-X- --XX--	Makes possible long non-stop runs.
-X--X--X--	For clearing the driver's view.	--X- -XX--X-	Used on the G.W.R. only.
X--X--XX- -X--	Unit in locomotive valve gear.	--XX- -X--X---X-	Name for American Control Officer.
-X-X- -X-X-X-X-	In the exhaust steam injector.	X-X- --X	Name of a L.N.E.R. locomotive.
---X-X-X	Details of line operation.	-X--X-	In the cylinder.

A NOVEL WORD-FINDING CONTEST

For our contest this month we have chosen a puzzle that is easy, and at the same time will attract members by the opportunity it gives them of showing how much they know of railway matters. The panel on this page contains two columns of mysterious dashes and crosses. These columns are headed "Hidden Words," and each of the 20 combinations of dashes and crosses represents a locomotive, an engine part, a lineside accessory, a piece of rolling stock or some other item of railway interest and importance. The clues to these names are given alongside, and all that competitors have to do is to use these clues to fit letters to the dashes and crosses. Each dash represents a consonant and each cross a vowel. It should be noted that in some instances the solution consists of two words. This is made clear by spacing the sets of crosses and dashes representing them.

When the hidden words have been found a complete list should be made out in order, and the entrant's name, age, full postal address and H.R.C. membership number written clearly on the back of the sheet. Even if the competitor does not find all of the 20 words forming the subjects of the contest he should send in his entry, for others may not be more successful than he, and there are many prizes to be awarded for the best efforts submitted.

As usual the contest will be divided into two sections, Home and Overseas, and prizes of 21/–, 15/– and 10/6 respectively will be awarded to the three competitors in each section who submit the most complete lists. In addition, a number of consolation prizes will be awarded to the best of the remaining entries. All prizes will consist of goods manufactured by Meccano Ltd. to the appropriate value, and successful competitors will be allowed to make their choice from current lists.

Envelopes containing entries should be posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st July. The closing date for the Overseas section is 31st October.

H.R.C. COMPETITION RESULTS

HOME

April "Drawing Contest No. 3."—First: E. Oldham (43390), Hyde, Cheshire. Second: F. T. Hornby (63400), London S.W.18. Third: R. G. Stott (59552), Cliffsend, Nr. Ramsgate, Kent. Consolation Prizes: M. Keenan (67625), Hemsworth, Yorks.; G. D. Howe (33408), Hull, Yorks.; J. Oxley (65876), Nr. Heysham, Lancs.; T. Patten (69686), Edinburgh 5; D. M. Murray (66020), Penrith, Cumberland; E. Carey (66185), Sheffield 6.

April "Missing Links Contest" (Senior Section).—First: W. Lobb (11765), Shaw, Nr. Oldham, Lancs. Second: D. B. Blackburn (49069), Minehead, Somerset. Third: H. G. Johnston (38784), Southall, Middlesex. Consolation Prizes: E. D. K. Apps (36237), St. Leonards-on-Sea, Sussex; D. W. Winkworth (1184), Thornton Heath, Surrey; P. V. Balfre (63505), London S.W.16; C. B. Pennington (40721), Manchester 20; W. H. Wakefield (70133), Cambridge; A. Elvey (59159), London S.E.9.

OVERSEAS

January "Locomotive Features Contest" (Senior Section).—First: D. Murison (37642), Buenos Aires, South America. Second: W. R. Hibbins (64719), Natal, South Africa. Third: T. A. Wade (63755), Johannesburg, South Africa. Fourth: F. J. Harrison (65068), South Rhodesia, South Africa.

Competition Suggestions

All H.R.C. members must have ideas about competitions, and our second contest this month provides them with an excellent chance of putting these to good use. What we wish them to do is to suggest six ideas for competitions. These should be original, and not merely based on competitions that have already appeared in these pages, and it must be borne in mind that they should have a railway interest.

Those who usually are called upon to work out the puzzles and teasers that we set them should find it of interest to plan out schemes that will both puzzle and attract their fellow members. We shall look forward eagerly to the results of their efforts.

To the senders of the three best suggestions in the Home and Overseas sections will be awarded prizes, consisting of any goods manufactured by Meccano Ltd., to the value of 21/–, 15/– and 10/6 respectively. A number of consolation prizes will also be awarded.

Each sheet submitted should have on the back the sender's name, age, full postal address and H.R.C. membership number, and envelopes containing entries should be clearly marked in the top left-hand corner *"H.R.C. Suggestions Contests."* Home entries should be posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st July and the Overseas section closing date is 31st October.

New Dinky Toys

This month's additions to the range of Dinky Toys are two splendid sets of British aircraft in Service camouflage, announced on page v of this issue. The first is a presentation set (Dinky Toys No. 68) that includes both military and civil types. There are miniatures of the famous "Spitfire" and "Hurricane" single-seater fighters, and the "Whitley" and "Bristol" Blenheim twin-engined bombers. Civil types represented are the "Ensign" and "Frobisher" liners.

The second Set (Dinky Toys No. 66) consists of an interesting range of models representing types of military aircraft. They include heavy and medium bombers, a two-seater fighter, torpedo-dive-bomber, dive-bomber fighter, and an Army co-operation Autogiro.

Motor Car Tyre for Icy Roads

A rubber tyre equipped with spring claws to grip the icy surfaces of roads during frosty weather has been introduced in America to make winter driving easier and safe. The claws are mounted on springs that run entirely round the tyre. The points are thrust out from the tread as the rubber carrying them expands on coming into contact with the ground and taking up the load. This causes them to dig into the road surface, and a large number of claws are gripping the road at all times.

Wear on the claws is small, the tyres being good for about 10,000 miles for running over icy roads, and even then leaving a tread that can be used in ordinary driving. A further advantage is that the claws make little noise on paved roads, over which cars fitted with the tyre can be driven at the usual speed.

Tom Sawyer is just the kind of friend any boy would want in his own circle. Mischievous, practical, teasing, courageous Tom, with his resourceful 'partner' Huck Finn, will never become old. Now they are a little older in years but still with the same bent for "trouble."

TELL YOUR PARENTS ABOUT

Tom Sawyer Grows Up

by CLEMENT WOOD

who writes in genuine Twainian style. They will enjoy giving it to you and then borrowing it back.

"We can never read enough about Tom Sawyer" says the "M.M."

(5/- net)

HARRAP

Germany's Fast Naval Motor Boats

It would be idle to ignore the fact that with her possession of the Dutch North Sea ports, Germany is likely to use fast motor boats for various purposes, which she was unable to attempt when such boats had to be based on German ports.

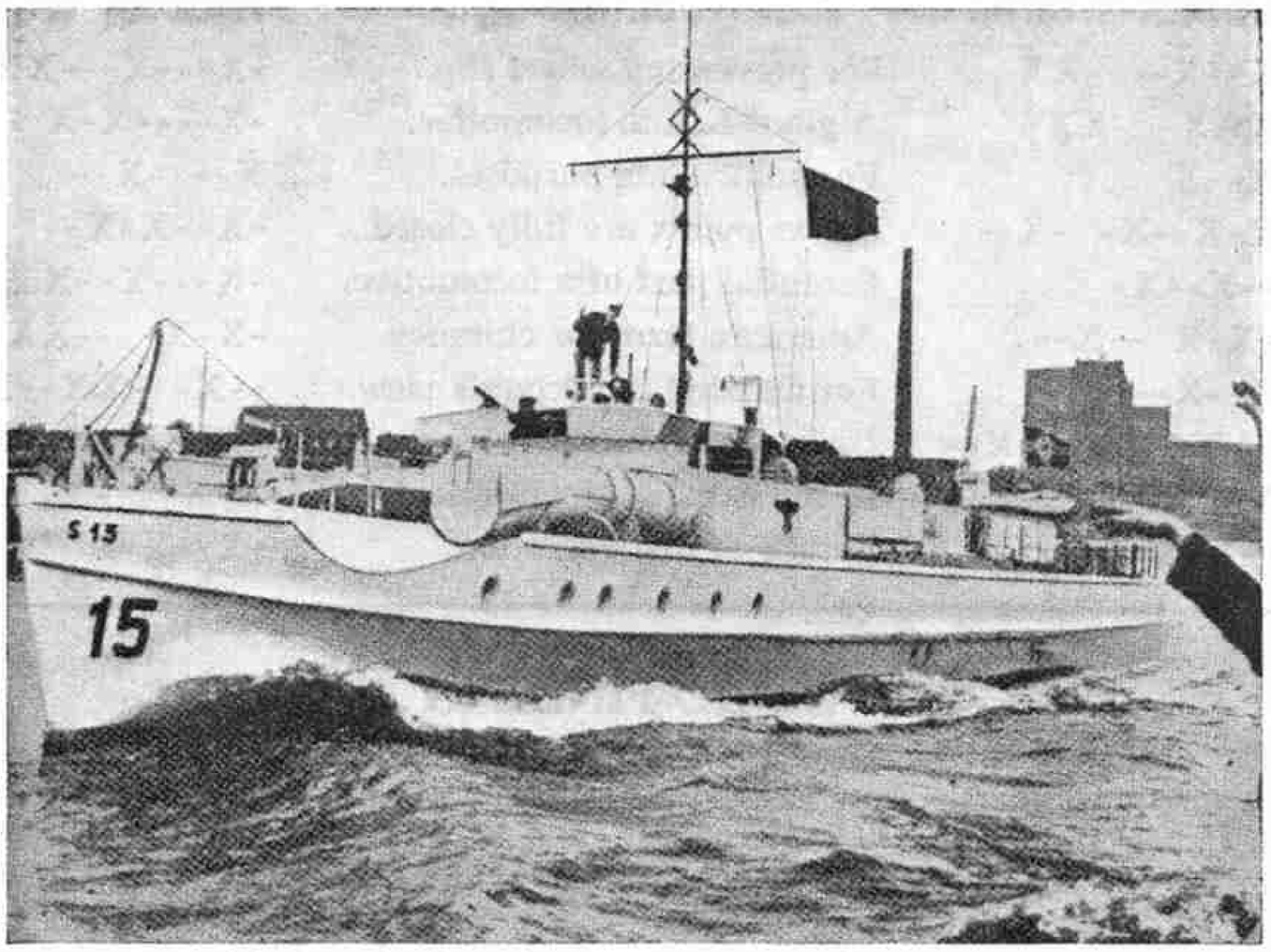
The motor craft in question will no doubt be utilized to harass and, if possible, sink merchant tonnage and Naval vessels. Night raids on the coast may be made, taking advantage of the small size of the boats, rendering them difficult to see, also their high speed; whilst efforts to land small numbers of men with the object of damaging certain objectives are not to be ruled out. Such information as is available concerning Germany's Naval motor craft is, therefore, of interest.

There are 40 boats of the R class (R.1–R.40) (Raumboote), 16 of which were built seven or eight years ago and the remaining 24 finished in 1938 or 1939. These are 45-ton craft, about 90 ft. in length, having a crew of 15 and a speed of 18 knots. R.1–R.10 were built and utilized for training, and were also employed as patrol boats.

The next series were the S class (Schnellboote), of which 15 had been finished before the end of 1938 and the other 17 are, no doubt, all completed. They are 90-ton boats, said to have a speed of 18 knots, and are equipped with two 900 h.p. M.W.M. Diesel engines. The complement is 17, and one of the interesting features is that eight of the craft (F.17–24) are equipped with Voith-Schneider propellers, utilized to give them exceptional manœuvring power. The adoption of Diesel engines in these craft was something of an experiment, in view of their relatively high weight, but the speed required was moderate and lightness of machinery was apparently not a first consideration.

In the early summer of 1936 it was recorded that Hitler, when inspecting the German Navy, was shown the latest type of motor torpedo boat. According to our information these craft had a displacement of 45 tons, were 92 ft. long and were equipped with three engines of the aeroplane type, each developing 100 h.p. Their speed, although not stated, should no doubt be about 35 knots, and for general cruising they are equipped with a 100 h.p. engine, so that an object of attack might be approached without noise. Two 21-in. torpedoes were carried and, at the time, it was stated that 10 of these craft had been built. It would be well to reckon that considerable numbers are now available.

We reproduce this article by courtesy of the Editor of "The Motor Boat and Yachting."



One of Germany's 32 fast motor boats of the S class. They are equipped with two 900 h.p. Diesel engines. We are indebted to "The Motor Boat and Yachting" for our illustration.

Flying Model Aeroplane Kits

Interest in model aeroplane building is growing rapidly, and all who are attracted by this splendid hobby will find valuable ideas and help in the catalogue of kits and accessories issued by our advertisers Elite Model Airplane Supplies, Manchester. This contains details of a splendid range of complete kits of parts for building flying scale models, including miniatures of the Hawker "Hurricane" and Supermarine "Spitfire." Kits for building solid scale models also are catalogued.

Useful hints are given to the beginner, and the catalogue certainly is one that every model aeroplane enthusiast should have by him. It may be obtained by forwarding 3d. to Elite Model Airplane Supplies, 14, Bury New Road, Manchester 8.

Developing Your Own Films

It is great fun to develop one's own films and make prints from them, and to do this as well as making the exposure is a fascinating way of obtaining the full enjoyment from the photographic hobby. Our advertisers Johnson and Sons Ltd., Hendon, cater specially for the home photographer, supplying him with the necessary developing and fixing chemicals made up in suitable form and quantity, and with everything else that is necessary, such as dark-room lamps, graduated measures, printing frames, etc.

Full details of these photographic products are given in booklets and leaflets issued by the firm, and we strongly advise every amateur photographer to write for copies of these to Johnson and Sons (Manufacturing Chemists) Ltd., Hendon, London N.W.4. The "*M.M.*" should be referred to when writing.

Realism in Model Brick Building

"Brickplayer," the bricks and mortar building kit advertised in our pages by J. W. Spear and Sons Ltd., is a real novelty in miniature brick building. In effect it introduces a new hobby marked by intense realism, for the bricks are built up into sound and rigid constructions with the aid of a cement or mortar supplied with the kit. Miniature houses, railway stations, bridges, castles and endless variety of buildings therefore can be erected in real bricks and mortar, and yet can be dismantled easily.

The kits can be obtained from toy shops and stores, and our advertisers J. W. Spear and Sons Ltd., Enfield, Middlesex, will be glad to send full details to all enquirers.

Competition Corner

A DOUBLETS CONTEST

Watch BIRD build NEST	Allow WOOD to BURN	Roll ROPE into COIL
Draw LINE with RULE	Turn BOAT into WIND	Light LAMPS with TAPER
Make WHIP SNAP	Sail BOAT on POND	Hang PAPER on WALLS
Let MILK turn SOUR	Set SNARE for STOAT	Order GUNS to FIRE

It is over a year since we last gave our readers a series of doublet puzzles to solve, and we feel sure that all who have tried this contest in the past will welcome its re-introduction.

A doublet consists of two given words, each containing the same number of letters. The problem is to change one word to the other by placing connecting words between. The connecting words are known as "links," and each may differ from the preceding link by the alteration of one letter only. Obviously the words used must contain the same number of letters as those comprising the doublet, and the test is to make the change with the smallest number of links.

To make the idea clear we give the following example: Fit HOOK to BOLT. This can be done in three steps, with two links, as follows: HOOK-book-boot-BOLT.

In making the changes only English words appearing in a standard dictionary may be used. Proper nouns, names of persons, places, etc., are not permitted. It is important to remember that the first solution arrived at is not necessarily the shortest. Competitors should go over their solutions carefully in search of short cuts that will eliminate unnecessary links.

In judging the entries the 12 doublets will be considered as one contest, and prizes of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– to be chosen by the winners from our current catalogues and price lists, will be awarded to the senders of the four best solutions in order of merit. In addition there will be a number of consolation prizes. In the event of a tie for any of the prizes, preference will be given to the entry having the neatest or most novel arrangement. The total number of links used must be noted on the first sheet of paper.

It will be observed that the combination of the 12 doublets for judging purposes will ensure that a brilliant solution of one doublet will carry its full weight by offsetting to some extent failure to arrive at the shortest chain in another.

"*M.M.*" competitions are set for the purpose of amusement, and this is one in which every reader can take part on equal terms. All the words are short and all that a competitor needs is a pencil and a sheet of paper, so that we look forward to a really big number of entries.

Entries should be addressed to "Doublets, Meccano Magazine, Binns Road, Liverpool 13," and must reach this office not later than 31st July. There will be a separate section of this contest for readers living overseas, that is outside Great Britain and Northern Ireland, Eire and the Channel Islands. The prizes in this section will consist of Meccano products to the same value as those in the Home Section. Overseas entries must be despatched to arrive not later than 31st October.

July Photographic Contest

This month we announce the fourth of our series of photographic competitions for 1940. The conditions ruling in this contest are very simple. Competitors are asked simply to submit photographs in each contest, and the prizes will be awarded to the best sent in. Entries may be outdoor scenes, or examples of indoor photography, but in each case an appropriate title must be written on the back of each.

War conditions have brought certain restrictions on outdoor photography. These apply to military, naval and Air Force subjects, and readers should take care to avoid photographing such things as docks, barracks, aerodromes and troops on the march. An article that appeared on page 200 of the April issue gives useful guidance on these points.

Each month's entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. In each section prizes of Meccano products or photographic material to the value of 21/– and 10/6 respectively will be awarded. There will be two similar sections with prizes of the same value for Overseas readers.

Entries in this month's competition should be addressed "July Photo Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing date in the Home section is 30th July, and that in the Overseas section is 30th October.

Competition Closing Dates

HOME	
July Doublets Contest... ...	31st July
July Photographic Contest ...	31st July
OVERSEAS	
April Hidden Titles Contest ...	31st July
April Photographic Contest ...	31st July
May Advertising Slogans ...	31st August
May Photographic Contest ...	31st August
June Crossword Puzzle Contest	30th September
June Photographic Contest ...	30th September
July Doublets Contest... ...	31st October
July Photographic Contest ...	31st October

COMPETITION RESULTS

HOME

"May Advertising Slogans Contest."—1. L. T. A. Bern (Portsmouth); 2. L. P. Hulatt (Taunton); 3. T. Hill (Bolton); 4. F. Whitehouse (Wolverhampton). Consolation Prizes: P. H. Bell (Stockton-on-Tees); J. Hold (Barnsley); A. J. Williamson (Southend-on-Sea).

"May Photographic Contest."—First Prizes: Section A, J. Taylor (Bradford); Section B, A. Audsley (Cobham). Second Prizes: Section A, F. Murley (Plymouth); Section B, G. H. Moss (London S.E.22). Consolation Prizes: H. B. Parker (Little Sutton); J. Mathews (Aylesbeare Common); Miss A. Roe (Sheffield 1); F. L. Atkins (St. Leonards-on-Sea); T. Hughes (Birmingham).

OVERSEAS

"February Drawing Contest."—First Prizes: Section A, C. C. Corleo (Malta); Section B, F. O. Iyayi (Nigeria). Second Prizes: Section A, T. A. Wade (Johannesburg, S.A.); Section B, A. Vanian (Cyprus). Consolation Prizes: M. Hunter (Johannesburg, S.A.); G. Allen (Canada).

"February Missing Words Contest."—1. J. R. Hurst (Buenos Aires); 2. C. J. Mallia (Cospicua, Malta); 3. D. Dundee (Canada); 4. G. W. Festenstein (Transvaal, S.A.). Consolation Prizes: M. P. Cozens (Victoria, Australia); G. Rey (Curepipe, Mauritius).

FIRESIDE FUN

AND WHAT THEN

Having detailed to the youthful applicant the duties the job would entail, the prospective employer said: "I will pay you a wage of fourteen and sixpence a week. Of course you will get more next year."

"Ah," came the airy reply. "I thought, some'ow, I was startin' work a bit too soon. Righto, then, I'll be back sometime next year."

* * * *

"Why is the church bell better than the organ?"

"The bell sounds when its tolled," the organ says, "I'll be blowed first."

* * * *

Diner: "I beg your pardon, but why do all these girls stare at me?"

Waitress: "I'm not supposed to tell you, sir, but we got some of our food from the school of cookery and home economics, next door, and if you are sick after eating that omelet, those girls have all failed in their examination."

* * * *

Post Office clerk: "Here, your letter is overweight."

McFire: "Over what weight?"

Post Office clerk: "It is too heavy; you will have to put another stamp on it."

McFire: "Yerra, get out wid your fooling, Sure, if I put another stamp on it, won't it be heavier still?"

* * * *

There was a knock at the kitchen door. When Mrs. Smith opened it, there stood a lanky negro youth.

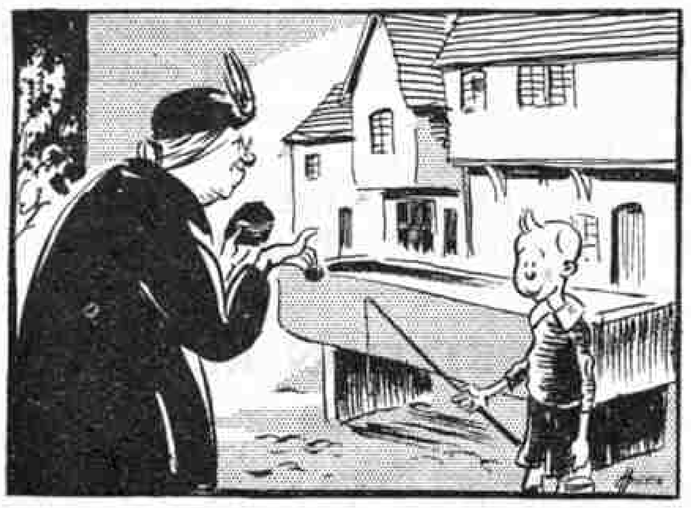
"Good mawnin', ma'am" he said. "I is lookin' fo' somebody that wants somebody to do sump'n. You all doan know nobody that wants to hiah nobody to do nothin, does you?"

* * * *

A young soldier handed in a telegram, reading: "Dear Mother, please send me ten shillings—am coming home by wire."

* * * *

GOOD SPORT



Kind old soul to little evacuee fishing in a horse trough: "There, there, Sonny. Here's a penny for you. How many have you caught?"

"You're the second, lady!"

* * * *

"A fortnight ago you gave me a plaster to get rid of my rheumatism."

"Yes."

"Now I want something to get rid of the plaster."

* * * *

The class was asked to write down the names of the 11 greatest people in the world. After a while the teacher said to little Roland: "Have you written them all down?"

"All but one," he told her. "I can't make up my mind who'll be goalkeeper."

* * * *

"On the right form platoon!" roared the sergeant. Gazing witheringly at the rabble that resulted, he continued: "And now take your partners for the Lancers!"

* * * *

A tiny evacuee from London refused to eat any greens with his dinner. His hostess said: "You must eat your greens, Johnny. They'll do you good. They're lovely and fresh."

"Fresh?" he said. "Garn. They've been in the garden ever since I've been here."

'OOT! 'OOT!

A town boy heard an owl hoot for the first time.

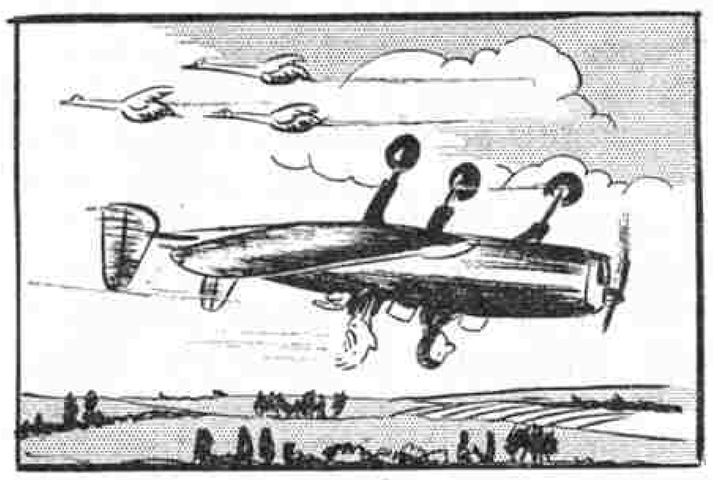
"What was that?" he asked.

"An owl," was the reply.

"I know that," he replied, "but what was 'owling?"

* * * *

RELATIVITY



An aviator was taking his friend for a flight. He indulged in several forms of aerobatics and was flying upside down when they passed a flight of ducks.

Said the passenger: "Shall we tell them?"

"Tell who?"

"Those ducks. They're flying upside down."

* * * *

A young man, undergoing an examination for a position, came across the question: "What is the distance of the earth from the sun?" He wrote his answer as follows: "I am unable to state accurately, but I don't believe the sun is near enough to interfere with a proper performance of my duties if I get this clerkship."

* * * *

French Soldier: "Allumette?"

British Soldier: "'Allo, Mate!"

* * * *

First Crook: "How did Bill die?"

Second Crook: "'E fell from some scaffolding."

First Crook: "Whatever was 'e doing up there?"

Second Crook: "Being 'anged."

* * * *

The new regimental trombone player had just been hearing all about himself from the conductor because of his persistence in always playing two bars ahead of the rest. "Sorry," he said, "but I used to play in a street band, and the bloke wot finished first was the one to go round with the 'at."

* * * *

Youngster: "Ha'penny's worth of brandy balls, and please wrap them up in a clean piece of paper, 'cos mother wants to write to Aunt Jane, and she hasn't any notepaper."

* * * *

"Look here, waiter, my lobster is without a claw. How is that?"

"Well, sir, they are so fresh that they fight with each other in the kitchen."

"Well, take this one away, and bring me one of the winners."

* * * *

Teacher: "What is the chief river of Egypt?"

Pupil: "The Nile."

Teacher: "Correct. What are its tributaries?"

Pupil: "The juveniles."

* * * *

Motorist ('phoning garage after accident): "Hello! Can you send me any help? I've turned turtle."

Voice: "Sorry, sir. This is a garage, not a zoo."

* * * *

Bandit: "Come on—hand over that hundred quid."

Post Office Clerk: "Sorry—you can only have three pounds on demand."

* * * *

Tramp: "I've asked for money, I've begged for money, and I've cried for money."

Gentleman: "Have you ever tried working for it?"

Tramp: "No, sir. I'm going through the alphabet, and I haven't got to 'W' yet."

BIT BY BIT

An emigrant was preparing to leave his native land to try his luck abroad. An acquaintance inquired: "What are you going to do when you arrive in America?"

"Take up land."

"Much?"

"Only a shovelful at a time."

* * * *

Two Irishwomen met again after some months. "Has your man started work yet, Mrs. Murphy?" said Mrs. O'Hara.

"Sure, and he has," said Mrs. Murphy; "it's hard work, and it's killing him, but thanks be, it's permanent."

* * * *

Mike: "Well, Pat, how are you these days?"

Pat: "Bad, mighty bad, sure 'tis starvation staring me in the face."

Mike: "Faith and it can't be very pleasant for either of you."

* * * *

Employer: "Yes, I advertised for a strong boy. Why do you think you will do?"

Applicant: "Well, I just licked the other eleven applicants outside your door."

* * * *

Teacher (lecturing on perseverance): "He drove straight to his goal. He looked neither to the right nor to the left, but pressed forward, moved by a definite purpose. Neither friend nor foe could delay him, nor turn him from his course. All who crossed his path did so at their own peril. What would you call such a man?"

Pupil (quickly): "A motorist!"

* * * *

Clerk: "How did you get on about your rise?"

Office Boy: "Oh, the Boss was like a lamb."

Clerk: "What did he say?"

Office Boy: "Bah!"

* * * *

The glazier's cry is one of pane,
The driver's one of whoa,
But happy farmers ne'er complain
They only cry "Hoe, hoe!"

* * * *

The teacher had written 9.7 on the blackboard, and, to show the effect of multiplying by 10, had rubbed out the decimal point.

"Now Alfred," she said, "where is the decimal point?"

"On the duster," replied Alfred, without hesitation.

* * * *

A popular referee at a certain boxing display appeared for the first time in evening clothes. When the first bout was due, he went into the ring and, with arms outstretched, turned slowly to secure silence.

As a deep hush settled over the audience, a voice from the back said: "It fits all right, Bert, what about buying it?"

* * * *

A number of young soldiers had been drafted to a small and historic town "Somewhere in England." Several of them were billeted in an old inn and the landlord proudly remarked to two of them about to retire for the night, "This is the very bed that the Duke of Wellington slept in years ago."

Next morning he asked, "How did you sleep last night?"

"Did you say the Duke of Wellington slept in that bed years ago?" inquired one.

"Aye," replied the landlord.

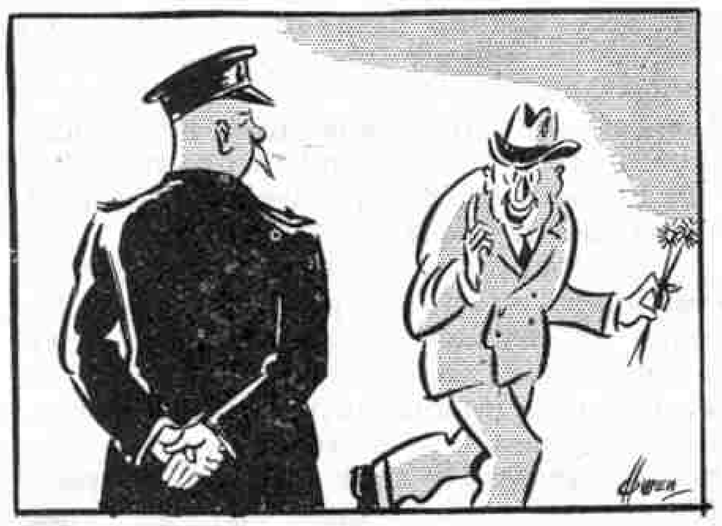
"Blimey," retorted the soldier. "No wonder they called him the Iron Duke."

* * * *

A doctor received a note which read as follows: "Please call and see my husband. It's his head; he's had it off and on all yesterday, and to-day he's sitting with it in his hands between his knees."

* * * *

HE KNEW



Asylum Patient: "Who are you?"

Official: "I'm the new superintendant."

Patient: "They'll soon knock that out of you. I was Napoleon when I came here."

* * * *

Tony: "Is he a man to be trusted?"

Jack: "Sure; I'd trust my life in his hands."

Tony: "Yes, I know—but can you trust him with anything of value?"

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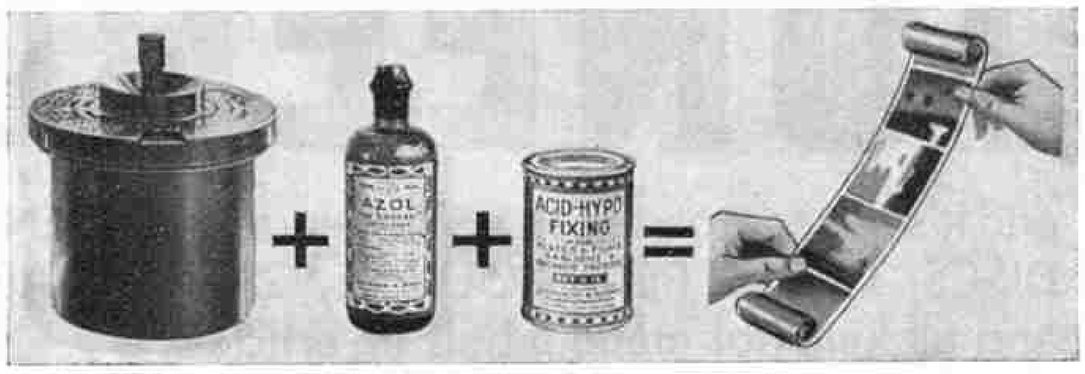

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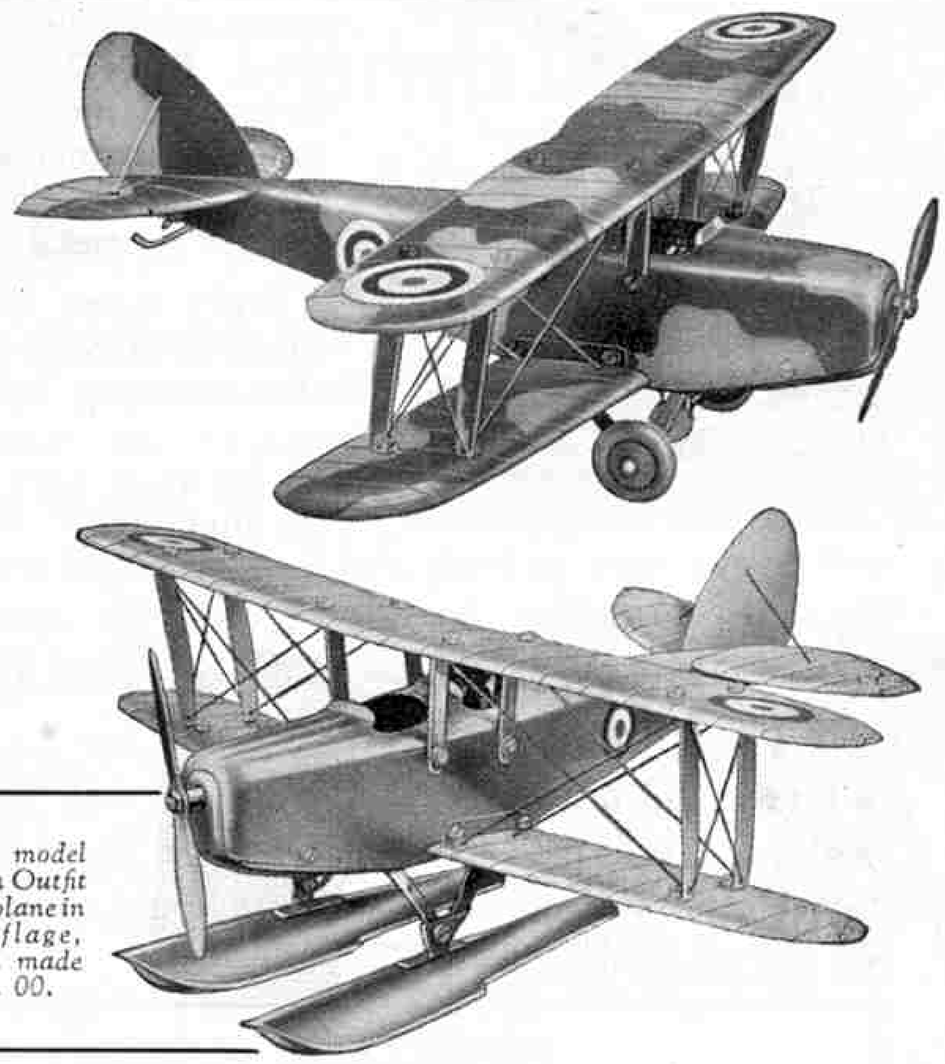

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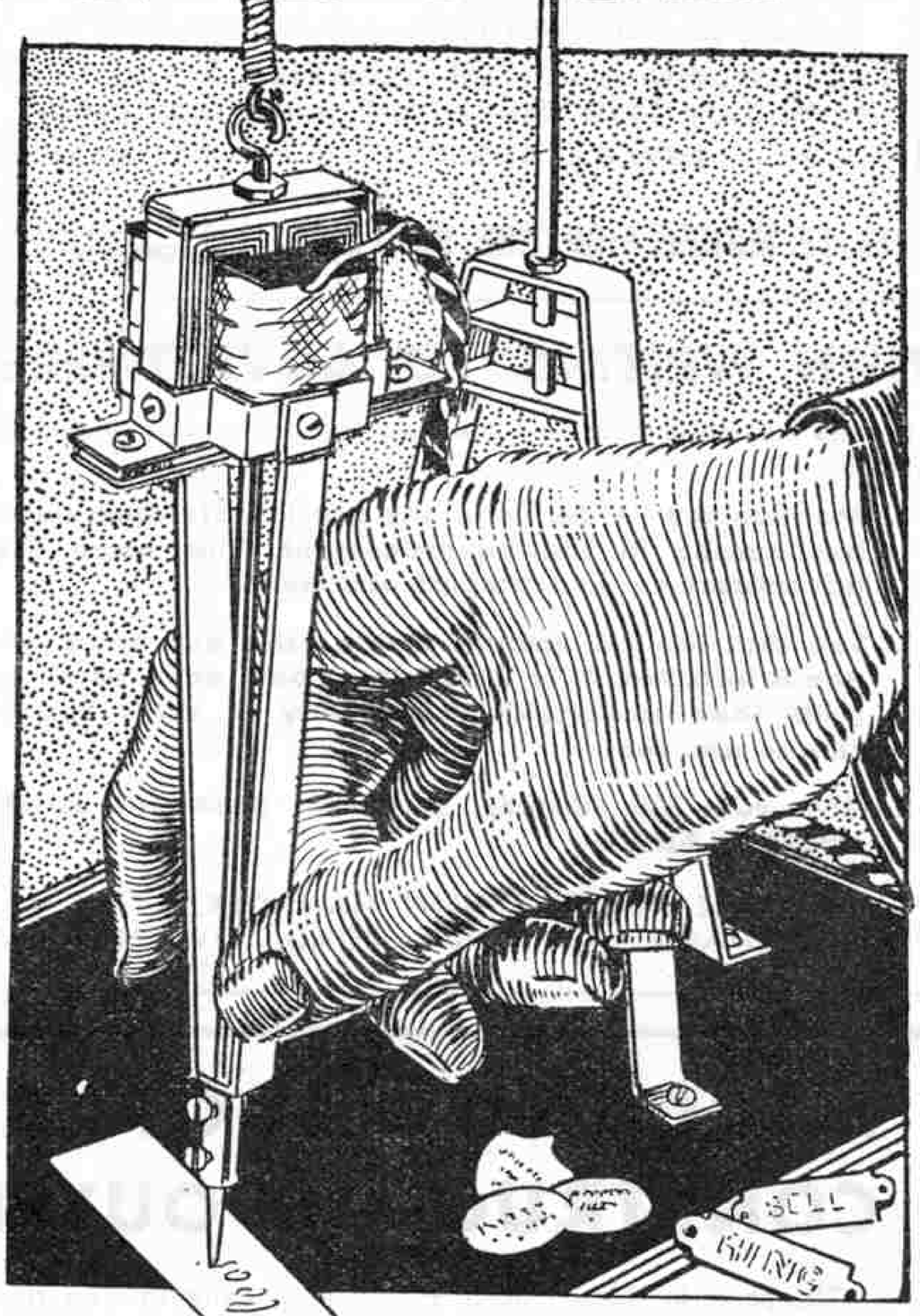

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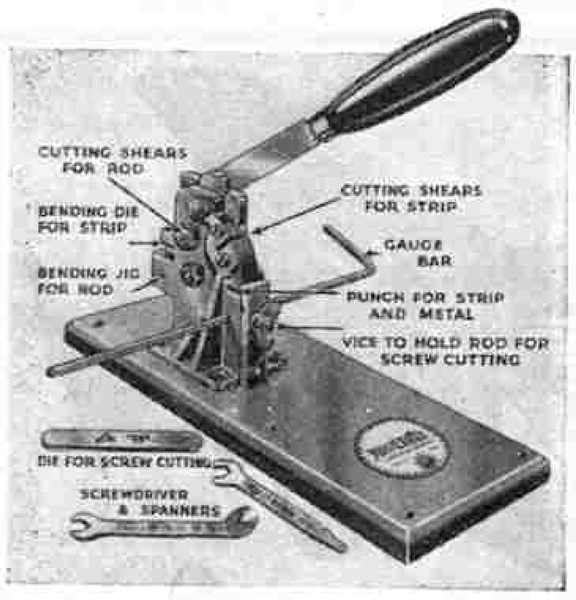
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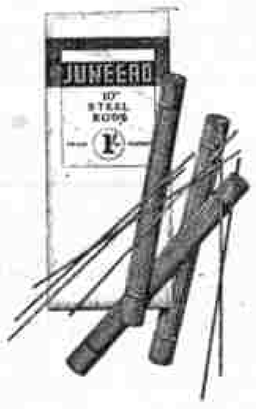

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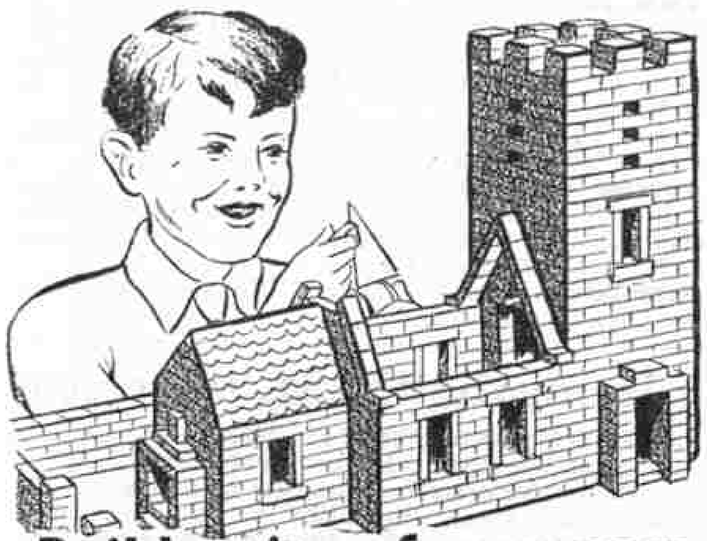

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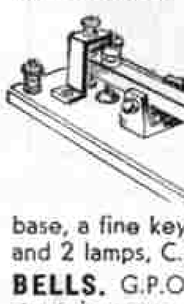

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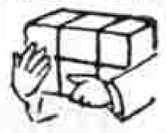

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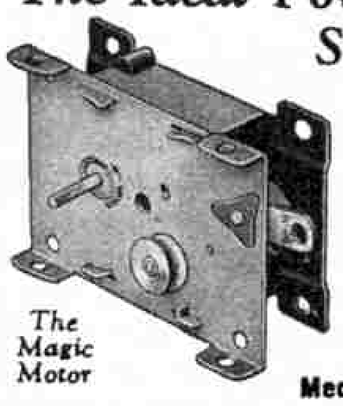

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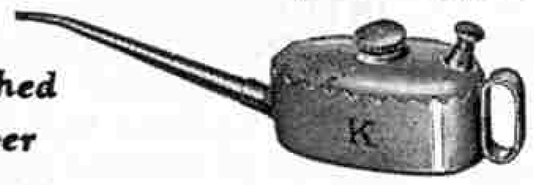

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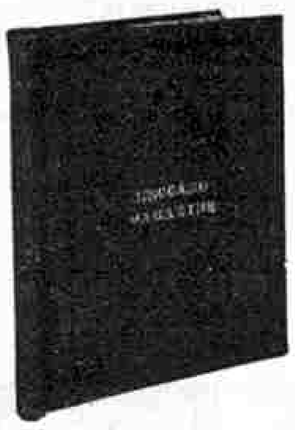

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To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

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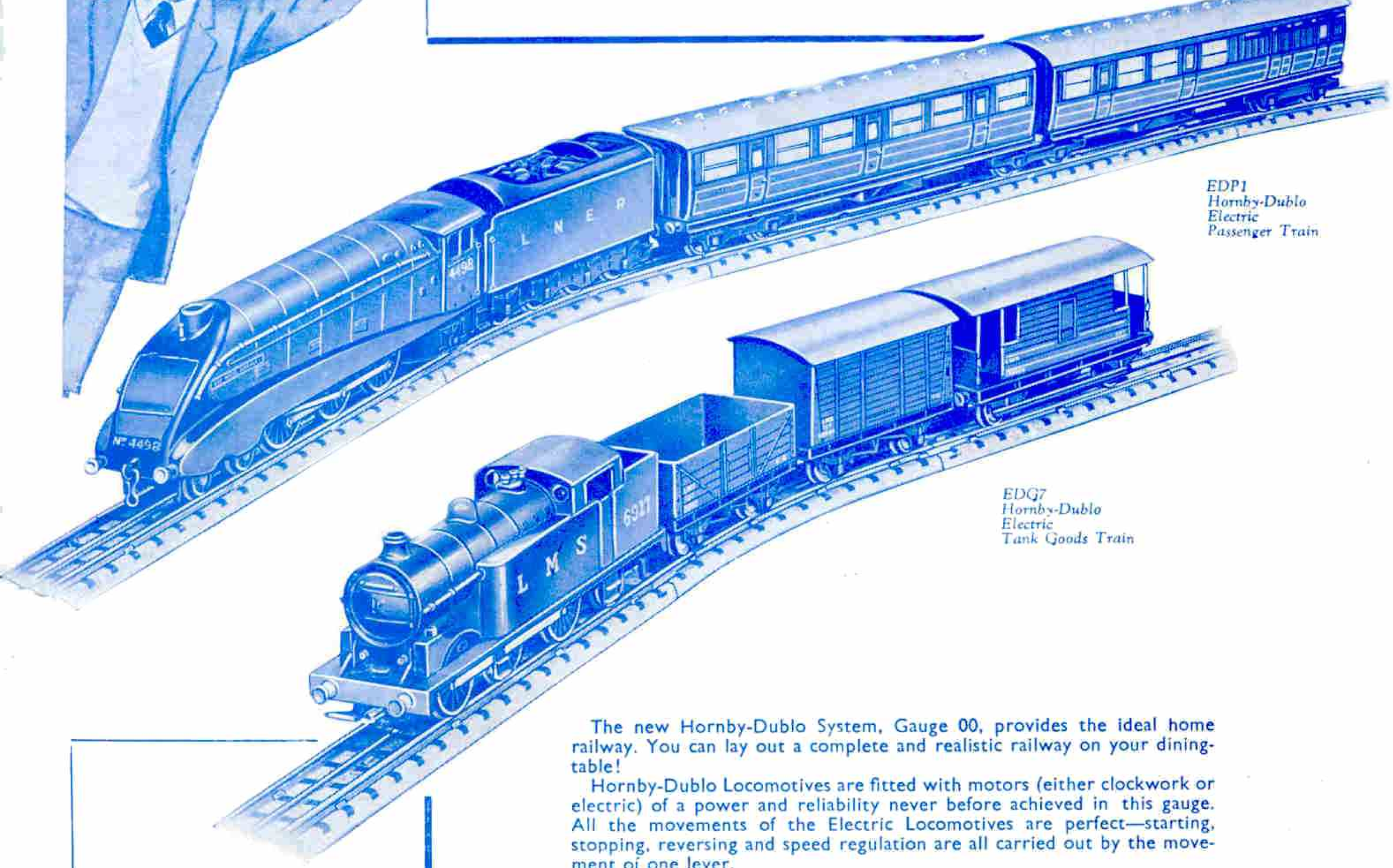

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